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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

VOLUME XXXVII — CLEVELAND, OHIO, APRIL 21, 1904 — NUMBER 16

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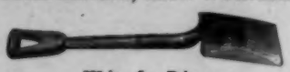

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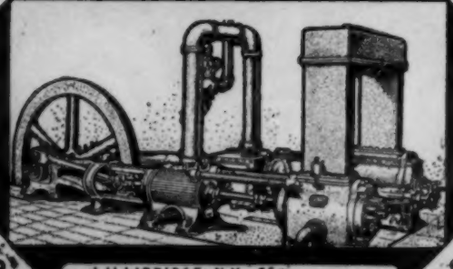

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, APRIL 21, 1904 NUMBER 16

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

In the absence of active buying, the iron trade centers its interest this week in the meeting of Lake Superior iron ore producers at New York and the renewal of negotiations for the sale of the Clairton Steel Co. to the United States Steel Corporation. The ore meeting after a five hours' session on Tuesday adjourned to Wednesday, with the understanding that the steel companies on the one hand and all the merchant ore firms save one on the other would hold separate meetings. No agreement was reached in the general meeting and it was decided that each party find out what concessions it was willing to make and report these at a second joint session Wednesday afternoon. This is now being held. At this writing the chance of agreement seems slight, the matter of allotment rather than price being the bone of contention. The merchant ore men insist that if there is an association all must enter it as miners of ore, so that ore for consumption in connected steel works, ore shipped on long time contracts and ore sold in the market in 1904 must be subject to one and the same rule. This would require the purchase of some ore in the market by the Steel Corporation and would give firms well supplied with long time contracts little or no ore to sell in the market this year; but the contention of the merchant ore interests is that any other basis of agreement would be easily evaded and would make any prices that might be fixed merely nominal. So far as prices are concerned, the views of the different interests were only 20 cents apart and compromise on that point alone would be easy.

The renewal of overtures for the transfer of responsibility for the Clairton Steel Co. from the Crucible Steel Co. of America to the United States Steel Corporation is interesting, coming in the same week with the final ore meeting and the decision of the Steel Corporation not to take May iron from the Bessemer furnaces of the Mahoning and Shenango Valleys. The corporation does not need the Clairton furnaces and steel plant, but their acquisition would mean the removal of a competitor in steel and prevent the selling of Clairton pig iron on the market. At the same time it would mean the end for many months of any pig iron buying by the Steel Corporation.

The meeting of Bessemer furnace companies in Cleveland Saturday was accompanied by the statement that all negotiations on May iron with the Steel Corporation were off. An extension of the option until April 20 had been talked of, but this was not done. The prospect of further business for the merchant furnaces from the Steel Corporation is considered so remote that the Valley steel works project, long talked of as necessary some day, to give furnaces in that district an outlet, is again up for discussion. The Bessemer pig iron market has not been affected as yet by the action of the corporation. Sales at $13.50 are reported in the past week.

The problem in the foundry iron market is whether the reduction of stocks at furnaces in March means increased consumption or in part, at least, represents the transfer of stocks from furnace yards to foundry yards. The action of certain furnaces in requiring that iron sold for March be taken forward or canceled throws some light on the question. Neither buyer nor seller shows any anxiety about the future. The latter has orders for most of the second quarter, and is not making enough money on them to want to duplicate the transactions; on the other hand the buyer is not looking for higher prices and is supplied for the present. The large business being figured on by pipe works, and the Pennsylvania tunnel castings, are a factor to be reckoned with.

The quietness in pig iron extends to finished material, and the feeling is not quite so hopeful, though no well defined ground for change in sentiment is found. The structural outlook is slightly better, in view of the tonnage for a C. & N. W. building at Chicago, a Baltimore contract, some New York business and good prospects for structural work in the Pittsburg district. Plates show little change for the better. Sheet and tin plate business has been more active since the wage reductions were agreed upon, and in the former there has been some good buying, though at lower prices. Pipe line orders have added to the accumulating tonnage of pipe mills in the week and the Standard Oil Co.'s contracts, which were about 100,000 tons in 1903, are expected to be as large for the present year. Bar iron is weaker in Western markets, but current productions of the mills holds up well. Car orders are more of a factor, and in addition to several scattering 1000-car contracts, a large order is being figured on by a Western road.

A sale of 10,000 tons of tin plate bars to Welsh works is reported at 80 shillings delivered. At Pittsburg billets are somewhat weaker. A sale is reported at $22 delivered Cleveland. The pool price is $23.50.

Latest advices from New York, not officially confirmed, are that a basis of $3.50 for old-range Bessemer, the price originally favored by the merchant ore interests, has been agreed to by the ore meeting and that the question of output is referred to a meeting to be held later in Cleveland.

PITTSBURG.

OFFICE OF *The Iron Trade Review*, 429 PARK BUILDING, April 20.

Several finished lines, notably sheets and tin plate, have displayed increased activity this week, no doubt due to the settlement effected with the Amalgamated Association last week, and negotiations on this wage reduction having held up considerable business during the past three weeks. Some low prices have been reported on sheets in large lots, the concessions granted the manufacturers giving additional leeway, and several contracts of upwards of 250 tons each have been reported closed on a basis of 2.20c for 28 gauge. On the other hand the majority of manufacturers are holding their product firmly on a basis of 2.30c, although 2.25c can be done on desirable orders. The demand for structural material is also increasing, most of the tonnage being in small lots but is from widely diversified interests. The contract for the erection of the Diamond National Bank building in this city was awarded last week but that for the structural work amounting to 1,300 tons has not yet been let. One large building in New York calling for 6,000 tons has been temporarily held up, while the contract for the Chicago & Northwestern building in Chicago calling for 3,000 tons is shortly to be placed. The elevated tracks for the Wabash and Pennsylvania railroads on Duquesne Way will probably be commenced this summer and the structural material for this work will require thousands of tons. Practically all of the building trades differences in Pittsburg have already been amicably adjusted and the outlook for new construction in this district was never better. Heavy orders for line pipe and casing have been placed during the week, one calling for 100 miles of 6-inch pipe, amounting to 5,000 tons, for

California delivery going to the Wheeling Steel & Iron Co., while the Philadelphia Co. of this city placed an order for upwards of 2,000 tons of pipe with an Eastern mill. Another order for approximately 2,000 tons of line pipe was also placed, while the Manufacturers' Light & Heat Co. of this city is figuring on a large tonnage. In addition the requirements of the Standard Oil Co. will be about equal to that of last year when their purchases amounted to over 100,000 tons. A slight improvement is noted in plates, but the demand is not nearly sufficient to insure steady operations of all the plate mills.

A meeting of merchant furnace interests producing foundry and forge iron, held at Columbus, O., last Friday for the purpose of forming an association to maintain prices, is of interest as it marks the first step in this direction among Central Western producers of these grades. Nothing definite was accomplished, only ten furnaces being represented, but it is believed that at the meeting called for Friday, April 22, some definite action will be taken. It is asserted that Eastern and Southern furnaces are securing relatively better prices for their iron at the furnace than Ohio furnaces and it is for the purpose of strengthening the situation in the Central West that this effort is being made.

The pig iron market in this district is extremely quiet, although few of the furnaces are in need of orders for early shipment. Orders placed some time ago will carry nearly all the Pittsburg district and Valley furnaces through the present month, while a comfortable tonnage is booked for delivery through the first half. On No. 2 foundry a wide range of prices is being quoted. Several excellent brands are sold on the basis of $14 Pittsburg, while some furnaces are securing from $14.50 to $14.85 for their product. Southern furnaces are firm and no better than $10 Birmingham can be done on No. 2. No action was taken at the meeting of the Bessemer Furnace Association at Cleveland last Saturday, relative to the cancellation of the May tonnage of Bessemer. It is not improbable, however, that the United States Steel Corporation will come into the market a little later for a smaller tonnage than was optioned for May delivery.

Negotiations are on again for the taking over of the Clairton Steel Co. by the United States Steel Corporation. The indications are that they will be closed this time at a lower price than was offered for the property some months ago.

Pig Iron.—The cancellation of the Steel Corporation's May tonnage of Bessemer with the merchant furnaces in the Valleys has not yet caused the weakening of the market that might be expected. We note the sale of 1,000 tons of Bessemer for delivery the remainder of this month at $13.50, at the furnace. There is no inquiry for either Bessemer or basic for May and June delivery, but it is doubtful if better than $13.25 at the furnace could be done at this time. Small lots of foundry iron are being sold, mostly for prompt shipment at prices ranging from $14 to $14.85. That $14.85 will be paid indicates the peculiarity of the foundry iron situation in view of the fact that several excellent brands are being sold at $14 Pittsburg. We make the following quotations:

Bessemer, Valley	$13 85 to 13 50
Bessemer, Pittsburg	14 20 to 14 35
No. 1 Foundry	14 75 to 15 00
No. 2 Foundry	14 00 to 14 25
Gray forge, Pittsburg	13 25
Chilled basic, Valley	13 00 to 13 25
Chilled basic, Pittsburg	13 85 to 13 95

Steel.—The steel market is quiet and there is little demand for billets or bars. Welsh mills are inquiring for tin bars and billets for delivery the third quarter and one lot of 10,000 tons has been sold at 80 shillings, delivered. Premiums for spot bars and billets are no longer being paid. Agreed quotations are as follows: Bessemer and open-hearth billets, 4 x 4 inches, and slabs, up to and including 0.25 carbon, $23 Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O., 0.26 and including 0.60 carbon, $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheet and tin bars are $1 per ton extra. Bessemer and open-hearth rods are still quoted at $30 to $31 Pittsburg.

Ferro-Manganese.—There is little demand for manganese and the market is quiet. Domestic 80 percent continues to be held at $42 to $42.50, delivered at buyer's mill east of the Mississippi.

Muck Bar.—The market is quiet and neutral muck is nominally $26.50 to $27.

Skelp.—While little new business is being placed, all the mills are operating in full and shipments are being hurried as fast as possible. We quote grooved iron at 1.50c to 1.55c and sheared at 1.60c. Grooved steel is held at 1.40c and sheared at 1.45c.

Spelter.—The market is firm at 5.15c to 5.18c for prime Western grades, delivered, Pittsburg, in carload lots.

Rails and Track Material.—The export department of the steel corporation received an order for 5,000 tons of rails for shipment to New Zealand. Little new business is being placed by roads in this country, however, although a number of inquiries are out. We quote: standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; 16 to 40 pounds, $23 to $24. Track material: Spikes, 1.65c to 1.70c.

Plates.—A slight improvement is noted in plates, the demand for plates for structural work improving while the steel car works are specifying more freely. We quote tank plates, ¼ inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Teffrms, net cash, in 30 days.

Bars.—Specifications on iron and steel bars are heavy, but the current buying is limited to small lots entirely. We repeat quotations: Bar iron, 1.40c to 1.45c, Pittsburg, for local delivery, while for Western shipment quotations are based on 1.35c, Pittsburg. Hoops are held at 1.40c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open-hearth, 1.40c; plow beams and cultivator beams, 1.35c, net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Structural Shapes.—New orders for structural shapes are more numerous and specifications are being received more freely by the mills. The local outlook is excellent for new construction this summer, and several large orders will be closed within a few months. The contract for the structural work for the Diamond National Bank building has not yet been placed. It amounts to 1,300 tons. Quotations are unchanged as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—The wage agreement entered into between the sheet and tin plate manufacturers and the Amalgamated Association last week calls for an 18 percent reduction on steel sheets and the same wages for rolling steel as iron, the latter having been rolled for 10 percent less than steel heretofore. The base on sheets has been reduced to 2.30c however. On tin plate the reduction amounts to 18 percent and the base has been reduced to $3.40 a box. The buying of both sheets and tin plate is heavy, numerous contracts for sheets for delivery to July 1 having been placed. On desirable orders as low as 2.20c has been done on sheets in 250 ton lots, but these concessions are by no means general. We make the following quotations: Black sheets, one pass, No. 8, 1.80c to 1.85c; No. 9, 1.85c to 1.90c; Nos. 12-14, 1.95c; Nos. 15-17, 2c; Nos. 18-21, 2.05c; Nos. 22-24, 2.10c; Nos. 25-26, 2.15c; No. 27, 2.20c; No 28, 2.30c; No 29, 2.60c; No. 30, 2.70c. Galvanized: Nos. 12-17, 2.40c; Nos. 18-21, 2.55c; Nos. 22-24, 2.70c; Nos. 25-26, 2.90c; No. 27, 3.10c; No. 28, 3.30c; No. 29c, 3.70c; No. 30, 4.10c.

Wire and Wire Nails.—Demand for wire and nails con-

tinues good, although the current buying is not as heavy as it was a month ago. The market is firm and there is practically no shading. Quotations are unchanged: Wire nails, carload lots to jobbers, f. o. b cars Pittsburg, are quoted $1.90 base; plain wire, carload lots, $1.80 base; barb wire, carload lots, $2.20 base; staples, carload lots, $2.05 keg. Galvanized, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel and iron cut nails, carload lots, $1.75, and less than carload lots, $1.80, f. o. b. Pittsburg, plus freight to points of destination. Terms, 60 days, less 2 percent off in 10 days.

Pipes and Tubes.—Several large contracts for line pipe and casing were placed during the past few days. The Wheeling Steel & Iron Co. was awarded a contract for 100 miles of 6-inch pipe for an oil line in California. This will require about 5,000 tons of material. The Philadelphia Co. also placed an order with an eastern mill for about 2,000 tons of pipe, while another order calling for a similar tonnage was placed by an eastern concern. The Manufacturers' Light & Heat Co. is contemplating the purchase of a large tonnage of line pipe, contracts for which are shortly to be placed. The requirements of the Standard Oil Co. it is estimated will be fully as large this year as last, when their purchases amounted to considerable over 100,000 tons. Demand continues fair and the outlook is bright. Discounts to consumers, carload lots f. o. b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼, ⅜ inch	68	58	66	56
½ inch	71	61	69	59
¾ to 6 inch	75	65	73	63
7 to 12 inch	71	61	68	58
Ex. Stg., plain ends, ⅛ to 8 in.	67	57	64	54
Double Ex. Stg., pl. ends, ⅛ to 8 in.	59	49	56	46

BOILER TUBES.

	Steel.	Iron
1 to 1½ inch	42½	30
1¾ to 2¼ inch	55½	38
2½ inch	58	43
2¾ to 6 inch	64½	50½
6 to 13 inch	55½	38

Merchant Steel.—At the meeting of the shafting manufacturers held last Wednesday in New York prevailing discounts were reaffirmed. Demand for merchant products is strong and the market firm. We make the following quotations: Cold rolled and ground shafting 52 off in carload lots and 47 percent off in less than carload lots. Tire steel, 1.50c, base; spring steel, 1.90c to 2c; toe calk, 1.85c, base. Tool steel is quoted 6 cents and upwards, according to the grade.

Old Material.—A large amount of heavy melting stock is now being offered in this market and prices are off from 50 to 75 cents a ton. The demand is not heavy and dealers are offering good stock at prices ranging from $13.50 to $13.75, gross ton, Pittsburg. There is little demand for cast scrap and small lots are being offered at $12. Low phosphorus stock is held at $16.75 to $17.25, but as the steel casting trade is quiet there is little moving. Rerolling rails are quoted at $14.75 to $15, while No. 1 wrought scrap is quoted at $14.75 to $15.

Coke.—The demand for foundry and furnace coke continues heavy, but shipments are being made more freely and premiums for prompt delivery are no longer being paid. Connellsville foundry coke is quoted at $2.15 to $2.50, while furnace is held at $1.60 to $1.65. During the week ending Saturday April 9, the upper Connellsville region produced 203,946 tons while the output of the lower region amounted to 55,708 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, April 19,

The local market is devoid of interest and prices are without material change. Pig iron maintains its strength, and additional Southern furnaces are asking $10.25, Birmingham, for No. 2. None of the leading producers will quote below $10, but $9.75 has been named by one furnace in the week. Northern grades show a corresponding firmness, though No. 2 foundry is still selling at $14 Chicago. There is a much easier tone to the coke market under the increased shipments of the last two weeks. Connellsville Coke is selling on the basis of $4.90 to $5.15 Chicago, and Southern grades at $4.00. Bar iron is weaker, and while 1.50c is quoted as the local market price, 1.45c has been more freely named, some reports stating that even this figure has been shaded on orders where the specifications were very desirable. The improvement in railroad orders for bar iron is worthy of comment. While railroad companies have not been ordering cars this year in proportion to their requirements, they have bought more freely in the past two months than at any time since they put into effect in the spring of 1903 their remarkable policy of economy. At the present time the specifications for material to go into the construction of cars form a good percentage of the tonnage on mill books. New specifications and orders are received almost daily and there is pending now an inquiry for 2,600 tons of iron from a Western car builder which it is expected will be placed shortly. The reports of railroads that came into the market for new equipment within the past week include the C. B. & Q., for 1,000 cars; Great Northern, 50 cars; Elgin, Joliet & Eastern, 250 cars; Northern Pacific, 1,000 cars, and a large Western system whose name is not divulged, for 10,000 cars. The Southern order for 3,000 cars noted some weeks ago has been let. A good tonnage was booked during the week in steel bars, and tire and plow steel have also shared in the increased demand, among the contracts for the latter being some running into July, 1905. Structural steel is quiet, and plates also are dormant. The only noteworthy contract of the week for the former material was one for about 3,000 tons let to the American Bridge Co., the material being required for the office building to be erected in this city for the C. & N. W. Ry. Sheets are in a ragged condition and the market may correctly be termed an open one inasmuch as the quotations of no two sellers agree. None of the mills are maintaining the schedule, prices being made in this market ranging from $2 to $2.50 below. Boiler tubes are also extremely quiet, and established discounts are shaded 5 percent to 10 percent. Scrap is without change, the only transactions of interest being the sale of 3,000 tons by the Santa Fe and a good sized tonnage by the Illinois Central, both lots, it is said. bringing good prices.

Pig Iron.—Comparatively speaking, little tonnage went on order books in the past week. Foundrymen have not yet become convinced that furnaces are in earnest when they refuse to consider orders at less than $10, and in some cases at less than $10.25. Having been accustomed for several months to working one furnace against another in the effort to get a price that would meet his views, the melter's conclusions have been considerably upset at finding a unanimity among producers in the maintenance of the $10 schedule. This has acted as a bar to the closing up of transactions pending. One sale of a 1,000 tons of No. 2 soft for April, May and June delivery was made last week on the basis of $10, Birmingham, the buyer being a large cast iron pipe interest, but the bulk of the transactions ranged from carload lots to 500 tons, the former preponderating. Northern iron is firm on the basis of $14 to $14.25 Chicago, for No. 2, with most of the furnaces sold up for the second quarter. Lake Superior charcoal iron is also strong at the quotations given below. We quote prevailing prices in this market as follows:

Lake Superior Charcoal	$15 00 to 15 50
Northern Coke Foundry No. 1	14 50 to 14 75
Northern Coke Foundry No. 2	14 00 to 14 25
Northern Coke Foundry No. 3	13 50 to 14 00
Northern Scotch Foundry No. 1	14 50 to 14 75
Ohio Strong Softeners No. 1	15 30 to 15 80
Ohio Strong Softeners No. 2	14 80 to 15 30
Southern Coke Foundry No. 1	14 35 to 14 60
Southern Coke Foundry No. 2	13 85 to 14 10
Southern Coke Foundry No. 3	13 35 to 13 60
Southern Coke Foundry No. 4	12 85 to 13 10
Southern No. 1 Soft	14 35 to 14 60
Southern No. 2 Soft	13 85 to 14 10
Southern Gray Forge	12 60 to 12 85
Southern Mottled	12 35 to 12 60
Southern Silveries (4% to 6% Silicon)	14 85 to 15 35
Jackson Co. Silveries (8% to 10% Silicon)	17 30 to 18 30
Alabama and Georgia Car Wheel	18 50 to 19 00
Malleable Bessemer	14 00 to 14 50
Basic Iron	13 85 to 14 85

Billets.—Local demand is limited to small lots from forging plants. Association prices are firmly maintained. We quote Bessemer and open hearth billets, 4 x 4 and

larger, up to .25 carbon, $24; up to and including .60 carbon, $1 extra; over .60 carbon, $2 extra. Axle and forging billets smaller than 4 x 4, $25 Chicago. Open hearth billets from store, $1.30 per 100 lb.

Iron and Steel Bars.—The demand for steel bars was much heavier in the last week than for several weeks preceding. Consumers are sending in specifications for full quotas on their contracts and the outlook is bright. Bar iron is weaker, and except in the case of carload lots and less which are sold on the basis of 1.50c Chicago, the market may be said to be at 1.45c. Hoops are quiet. Demand from warehouse stocks is good and jobbers are very sanguine as to the outlook. We continue to quote on carload lots, mill shipments, Chicago delivery: Bar iron, 1.45c to 1.50c, full extras; soft steel bars, 1.51½c half extras; with 5c to 10c per 100 pounds extra for less than a carload lot and with the regular extras for less than a ton of a size; angles, less than 3 x 3, 1.56½c base, half extras; hoops, 1.56½c full extras. On lots from store, we quote iron, 1.65c; steel, 1.75c base; hoops, 2.10c rates.

Sheets.—The situation in both black and galvanized sheets is unchanged. Prices are in a ragged condition, the schedules known as "official" being shaded by all the mills from $2 to $2.50 per ton. Demand is of good proportions, though the uncertainty regarding the labor outlook is a depressing element in the local situation. We continue to quote the prices of the leading producers which are the basis on which the reductions mentioned above are made. One pass, cold rolled, black sheets, mill shipments, Chicago delivery, Nos. 16 and 17, 2.16½c; Nos. 18 and 21, 2.21½c; Nos. 22 and 24, 2.26½c; Nos. 25 and 26, 2.31½c; No. 27, 2.36½c; No. 28, 2.46½c; No. 29, 2.76½c; No. 30, 2.86½c. Galvanized sheets, carload lots, mill shipment, Chicago delivery: Nos. 16 and 17, 2.56½c; No. 18 and 21, 2.71½c; Nos. 22 and 24, 2.86½c; Nos. 25 and 26, 3.06½c; No. 27, 3.26½c; No. 28, 3.46½c; No. 29, 3.86½c; No. 30, 4.26½c. On small lots from store, we quote black sheets as follows: Nos. 8 and 10, 2.15c to 2.20c; No. 12, 2.20c to 2.25c; No. 14, 2.30c to 2.35c; No. 16, 2.40c to 2.45c; Nos. 18 and 20, 2.50c to 2.55c; Nos. 22 and 24, 2.55c to 2.60c; No. 26, 2.65c to 2.70c; No. 27, 2.75c to 2.80c; No. 28, 2.80c to 2.85c; No. 29, 2.95c; to 3c; No. 30, 3.10c to 3.25c. Galvanized, 75 and 7½ percent.

Structural Steel.—The market remains quiet, the only transaction of interest being the contract let to the American Bridge Co. for the material to go into the construction of the new office building of the Chicago & North Western railway, the tonnage of which is said to be in the neighborhood of 3,000 tons. Jobbers report there is a good demand from warehouse stocks in small lots and that store prices are well maintained. We quote carload lots, mill shipments, Chicago delivery, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—Business continues quiet, the continued operation of the local mill being governed by the specifications received daily. We quote carload lots, mill shipments, Chicago delivery: Tank steel, ¼ inch and heavier, 1.76½c; flange steel, 1.86½c; marine, 1.96½c; universal mill plate, 1.76½c to 1.81½c; 3-16 inch tank, 1.86½c; Nos. 7 and 8, 1.91½c; No. 9, 2.01½c; No. 10, 1.91¼c; No. 11, 1.06½c; No. 12, 2.01½c. From store, we quote tank steel, ¼ inch and heavier, 2c; 3-16, 2.15c; No. 8, 2.20c; No. 10, 2.25c; flange steel, 2.35c, all f. o. b. warehouse.

Rail and Track Supplies.—Inquiry from both electrical and steam roads is heavy, but the resulting tonnage from same booked by mills is not anywhere near as large. Specifications, however, to the local mill are gratifyingly large. Track supplies are also moving freely. Prices are unchanged, and we quote heavy rails, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails, $24 to $28, with regular differentials for intermediate sizes. The following quotations on track supplies, which are f. o. b. Joliet mill, may be shaded on large orders: Angle bars, 1.40c to 1.50c; spikes, first quality, 1.70c to 1.80c (out of store, 1.90c rates); track bolts, 3½ x ¾, with square nuts, 2.40c to 2.50c per 100 pounds; with hexagon nuts, 2.55c to 2.65c, with usual differentials for other sizes.

Merchant Steel.—There has been a good volume of buying in the past week, tire steel and plow steel being in principal demand. Mills are well sold ahead and specifications each day are in ample proportions. Prices are unchanged, and we quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 2c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.30c and upward, according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½c to 8c; special tool steel, 12c and up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than car lots.

Cast Iron Pipe.—Nothing of importance has transpired in the period under review, the week's tonnage being made up entirely of the usual run of small lots. We quote carloads, mill shipments, Chicago delivery: 4-inch water pipe, $26; 6-inch to 12-inch, $25; larger sizes, $24; gas pipe, $1 a ton higher.

Merchant Pipe.—Mills report an ample volume of specifications and that the outlook for future business is very bright. Prices are without change and we quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guar. Wrought Iron.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¾ inch	66.35	56.35	64.35	54.35
½ inch	69.35	59.35	67.35	57.35
¾ to 6 inches	73.35	63.35	71.35	61.35
7 to 12 inches	69.35	59.35	66.35	56.35

Less than carloads, 12½ per cent. advance.

Boiler Tubes.—There is very little doing in this product, and established quotations continue to be shaded to a point that will get the business. As a basis, we quote the following prices for carload lots, mill shipments, Chicago delivery, though they may be bettered from 5 percent to 10 percent.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	43.35	40.35	53.35
1¼ to 2¼ inch	55.35	38.35	40.35
2½ inch	58.35	43.35	40.35
2¾ inch to 5 inch	64.35	50.35	Up to 4 inches.
6 to 12 inch	55.35	35.35	48.35

For car lots or less, direct from warehouse stock:

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	40	35	37.50
1¼ to 2½ inch	50	32.50	35
2¾ to 5 inch	60	45	Up to 4 inches.
6 to 12 inch	50	32.50	45

Wire Products.—Field fencing of all kinds, poultry netting and wire nails are in active demand, jobbers and consumers sending in large specifications. The manufacturing trade is also very active, and business from this source keeps up in a remarkable manner. There are no changes in prices, and we quote to jobbers, carload lots, Chicago delivery, as follows: Wire nails, carload lots, $2.10; less than carload lots, $2.15; cut nails, carload lots, 1.91½c base; less than carload lots, 1.96½c; smooth wire, carloads, $2, and $2.05 for less than carload lots; galvanized smooth wire, $2.30 in carloads, and $2.35 in lesser amounts; painted barbed wire, $2.40 carloads, and $2.45 in less than carload lots; galvanized barbed wire, $2.70 carloads, and $2.75 less than carload lots. Staples, polished, carloads, $2.25; less than carload lots, $2.30; galvanized, $2.55 carloads and $2.60 less than carload lots. Bale ties, 82½ and 5 percent discount, f. o. b. Waukegan, Ill., on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or De Kalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Foundry Coke.—The market is much easier than it has been for several weeks, due to the increased shipments from Connellsville. Prices of coke made in the latter region range from $2.25 to $2.50 at the ovens, making it $4.90 to $5.15 Chicago. Southern grades are firm on the

basis of $4.90 Chicago. Solvay coke is being offered at $5.10 Chicago.

Old Material.—There is little demand for any kind of scrap from consumers, though dealers are buying all that is offered. Two notable transactions in the past week were the sale of 3,000 tons of old material by the Santa Fe, and a lot by the Illinois Central, both deals, it is said, being closed at good prices. Most of the rolling mills are out of the market, except for special lots, though there is some demand from foundries and open hearth plants. Cast borings, mixed borings and stove plates are slightly lower than a week ago, while splice bars are higher. We have revised our quotations, and quote dealers' selling prices gross tons, as follows:

Old iron rails	$16 50 to 17 00
Old steel rails (mixed lengths)	11 25 to 11 75
Old steel rails (long lengths)	13 00 to 13 50
Relaying rails	23 00 to 24 00
Old wheels	13 50 to 14 00
Heavy melting steel	11 25 to 11 75
Mixed country steel	9 50 to 10 00

The following are selling prices for net tons:

Low phosphorus scrap (.04 and under)	$13 00 to 14 00
No. 1 R. R. wrought	12 50 to 13 00
No. 2 R. R. wrought	11 50 to 12 00
Shafting	13 50 to 14 00
Dealers' forge No. 1	9 75 to 10 25
No. 1 cast	11 50 to 12 00
No. 1 busheling and wrought pipe	9 00 to 9 50
Heavy cast (300 pounds and over)	8 50 to 9 25
Agricultural malleable	9 00 to 9 50
Iron axles	16 50 to 17 00
Steel axles	15 00 to 16 00
No. 1 boilers, cut	8 50 to 9 00
Cast borings	4 50 to 5 00
Mixed borings, etc	4 50 to 5 00
Wrought turnings	7 25 to 7 75
Machine shop turnings	7 25 to 7 75
Iron axle turnings	8 25 to 8 75
Steel axle turnings	8 25 to 8 75
Stove plate and light cast scrap	9 00 to 9 50
Old iron splice bars	13 50 to 14 00

C. E. Louis, 541 The Rookery, Chicago, has been appointed agent in Chicago and the Northwest territory for the Futwiler Coal, Coke & Iron Co., Birmingham, Ala., in the sale of the product of its Vanderbilt furnace.

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
1064 ROSE BUILDING, April 19.

The market, which until very recently warranted the hope of very satisfactory conditions throughout the summer, has settled into a state of quietude and doubt. While there are no positive indications of weakness and prices are, as a rule, well maintained, buying is confined to small quantities and there is much uncertainty concerning the future. The failure of the steel corporation to exercise its option on 45,000 tons of Bessemer has had a depressing effect and the prospect that the question of ore prices would be settled this week has had a tendency to cause buyers to await the effect on the market of the New York meeting of ore representatives.

Iron Ore.—Conferences between the Lake Carriers' Association and the Masters' and Pilots' Association have resulted in a failure to agree on the question whether a vessel owner might discharge a captain without consent of the union. These conferences were held in accordance with an agreement made last year, but no arrangement has been made for further meetings. The principal controversy—one that may indefinitely delay the opening of navigation—will be in regard to the policy of the Pittsburg Steamship Co. of making individual contracts with the masters. This company has agreed to pay its engineers the same wages as last year, but will pay them by the month instead of by the year. No engineers have yet been appointed for this season. The ships of the Tomlinson fleet have now been enrolled with the Lake Carriers' Association.

Pig Iron.—An effort is being made to unite the blast furnace interests of Ohio in an association to regulate prices. A preliminary meeting was held in Columbus a few days ago and a second meeting will be held Friday of this week. Those who attended the meeting last week expressed a desire to promote the welfare of the manufacturers of pig iron, and some interests not represented sent letters indorsing the general purpose of the movement, but nothing definite was accomplished. It is recognized that as long as competition from the South is unrestricted, it will be difficult to maintain prices of Northern irons which compete with the Southern product. Inquiries have not been so numerous this week. Prices for Northern irons show little change, although $13.25 in the Valley for No. 2 is now seldom heard of, the usual quotations being $13 to $13.15. Local furnaces are now delivering No. 2 foundry in Cleveland at $13.50. Southern iron is not now an important factor in this market. It is weaker, the price of several weeks, $10 Birmingham for No. 2, having been shaded 25 cents by commission houses. We quote as follows for Cleveland delivery save on Northern gray forge, which is at Valley furnace:

Bessemer	$14 35 to 14 85
No. 1 Strong Foundry	14 10 to 14 25
No. 2 Strong Foundry	13 85 to 14 10
No. 3 Foundry	13 40 to 13 75
No. 2 Southern	13 16 to 13 85
Gray Forge, Valley furnace	13 40 to 13 75
Gray Forge, Southern	12 25 to 12 50
Lake Superior charcoal	14 50 to 14 75

Finished Material.—Efforts to interest capital in the building of new vessels have not succeeded and there is now no prospect of contracts being made. If orders were placed this month, the new vessels could make only a few trips this season, as they would not be finished before August 1, and capitalists who might be disposed to invest, if conditions were more favorable, prefer to wait and see whether lake business will not be better and prices of steel lower. Bar iron at 1.35c, Pittsburg, is being maintained by mills in this district, but Cleveland salesmen find it impossible to take orders in the territory near the Indiana mills, which are selling at about 1.30c at their plants. Steel bars at 1.35c for Bessemer and 1.40c for open hearth, Pittsburg, are dull, but specifications are coming in satisfactorily. Independent mills are offering sheets at from $2 to $4 below the prices of the principal producers. Prices of the principal producer through jobbers are as follows: Mill sales of black sheets, No. 10, 1.75c; No. 11-12, 1.80c; No. 14, 1.85c; No. 16, 1.95c; No. 27, 2.20c; No. 28, 2.30c. Galvanized, 80, and 3 off. Out of stock prices are as follows: No 10, 2.10c; No. 12, 2.15c; No. 14, 2.20c; No. 16, 2.30c; No. 18-20, 2.40c; No. 24, 2.45c; No. 25-26, 2.50c; No. 27, 2.55c; No. 28, 2.65c; No. 30, 3.10c. Galvanized out of stock, 75, 10 and 5 off.

Old Material.—The market is extremely dull. Heavy steel, railroad wrought and stove plate are from 50 cents to $1 lower and the general tendency is downward, the transactions are so few that it is difficult to give exact quotations. We quote as follows for gross tons Cleveland:

Old iron rails	$19 50 to 20 00
Old steel rails (over 6 feet)	14 00 to 14 50
Old steel rails (6 feet and under)	13 50 to 14 00
Old car wheels	13 00 to 14 00
Steel boiler plates	10 00 to 11 00
Malleable iron (railroad)	12 50 to 13 00
Malleable iron (agricultural)	10 00 to 10 50
Heavy steel	13 50 to 14 00

We quote the following net tons:

No. 1 R. R. Wrought	$13 00 to 13 50
No. 1 busheling	11 50 to 12 00
No. 1 machine cast scrap	11 50 to 12 00
Iron axles	16 50 to 17 50
Axle turnings	9 00 to 10 00
Wrought turnings (free from cast)	8 25 to 8 50
Uncut wrought iron boilers	5 00 to 6 00
Grate bars	9 00 to 10 00
Pipes and flues (clean)	10 50 to 11 50
Tank iron	9 50 to 10 50
Hoop and band iron	5 00 to 6 00
Sheet iron	4 00 to 5 00
Wrought drillings	7 00 to 8 00
Stove Plate	8 00 to 8 50
Steel axles	14 00 to 15 00
Cast borings	5 50 to 6 00

CINCINNATI.

April 19.

The coke market has been fairly active the past week, with no change in prices. Foundry coke is still selling at $2 to $2.25, f. o. b. Connellsville, the same as for the past several weeks.

Pig Iron.—The market continues the same as a week

ago. There is an undertone of strength in spite of the small demand. While offerings are ample for the wants, the sold-up condition of the Southern furnace interests is encouraging strong holding in that quarter, and we now hear of some furnaces in the South talking $10.50 for No. 2 foundry, which, of course, is above the market as there are ample offerings on a basis of $10 Birmingham for No. 2 foundry. Inquiry is moderate as foundries seem fairly well supplied up to July 1, and are needing very limited quantities. There were two inquiries attracting some attention in the trade one for 1,500 tons for an Indiana concern for delivery during July, August and September, and 3,000 tons of No. 2 and No. 3 foundry for May and June delivery in Detroit. These two contracts were actively sought after, but at this writing have not been closed. Gray forge and No. 4 foundry are still relatively scarce, with good inquiries. No. 3 foundry is still more plentifully offered than the other grades. In Ohio irons the situation remains without change. In the Ironton district, $12.50 furnace for No. 2 foundry is regarded as minimum, and in the northern part of the State, $13 to $13.50 for No. 2 foundry at furnace is the range of quotations. Inquiries have been before the trade here in connection with the large Eastern tunnel contract, and it is understood that a quotation has been made covering the entire lot, but the purchasing interest seems inclined to defer closing the deal. The refusal of the United States Steel Corporation to avail itself of the option on Bessemer iron on April 10, had no apparent effect upon the tone of the market here, and the trade regards any effect which it may have on the price of Bessemer as only temporary. Current prices f. o. b. Cincinnati are:

Southern Foundry No. 1	$13 25 to 13 50
Southern Foundry No. 2	12 75
Southern Foundry No. 3	12 25
Southern Foundry No. 4	12 00
Southern Foundry No. 1 soft	13 25
Southern Foundry No. 2 soft	12 75
Gray Forge	11 75
Northern Foundry No. 1	14 15 to 14 65
Northern Foundry No. 2	13 65 to 14 15
Northern Silvery (8% silicon)	16 15 to 16 65
Southern car wheel iron	16 75 to 17 00

Finished Material.—There is no change in the market this week. Jobbers report fair trade with prices well maintained. Plates are dull; sheets in fair demand with bar iron steady to firm, but not quotably changed. There is no important change in structural shapes but structural yards are finding a moderate demand. Bar iron is quoted at 1.45c f. o. b. Steel bars are advanced to 1.48c base, half extras, with dealers quoting 1.75c to 1.90c for iron and steel out of store. Galvanized sheets are being quoted at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.45c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.80c; No. 27, 2.70c; No. 16, 2.45c; No. 14, 2.35c; No. 12, 2.30c; No. 10, 2.25c Tank plates are dull and sell out of store at 2c for ¼-inch and 2.10c for 3-16 inch. Beams and channels are quoted at 1.90c to 2c from stock and angles at 1.90c to 2c for base sizes.

Merchant Pipe.—The market remains rather quiet and orders are not up to expectations, still, the amount of work reported in the hands of architects leads to the belief that with better weather for building operations, the demand will improve. Some independent mills are seeking business at inducements, but this is not done to an extent sufficient to disturb the schedule of the leading interests. We quote carload lots, f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	64.7	54.7
½ inch	69.7	59.7	67.7	57.7
¾ to 6 inch, inclusive	73.7	63.7	71.7	61.7
7 to 12 inch, inclusive	69.7	59.7	66.7	56.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—Prices are unchanged with railroads offering very little and dealers in scrap firmly maintaining prices. The volume of business, however, is light. We quote:

Old No. 1 railroad wrought, net tons	$11 50 to 12 00
Cast machine and foundry, net tons	11 00 to 11 50
Old iron rails, gross tons	16 00 to 16 50
Old steel rails, gross tons	12 50 to 13 00
Old short lengths, gross tons	11 00 to 12 00
Old iron axles, net tons	15 50 to 16 50
Stove plate, net tons	9 50 to 10 50
Wrought turnings, net tons	7 50 to 8 00
Cast borings, net tons	4 50 to 5 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., April 19.

Pig Iron.—In point of activity the market during the week showed a slight falling off, with prices a little irregular both for Northern and Southern makes. Business on the whole, however, continues satisfactory, and many furnaces report they are now shipping more iron than they are making. The Southern situation is still a confusing one. For Southern No. 2 foundry $10 Birmingham is the controlling figure. While $10.25 and $10.50 have been quoted, business at these figures is not authenticated. It is reported that $10 has been shaded. One important company is still out of the market for all grades, but other Southern interests are open for orders and are able to supply a pretty fair tonnage. In Northern irons, while there is no change in our quotations, prices are not as firm as at our last report. There is a fairly good demand for basic, but foundry grades are not active. Consumers have not changed their attitude regarding purchases, and are only placing orders as occasion requires. Current contracts invariably call for delivery on or before July 1, and neither buyers nor sellers seem anxious to do business beyond that date. The orders for the Pennsylvania castings have not yet been given out and definite information as to when they will be cannot be had. New York prices on pig iron are as follows: Northern No. 1 X, $15.50 to $15.95; No. 2 X, $14.75 to $15.20; No. 2 plain, $14.50 to $14.95; Southern No. 1 foundry, $14 to $14.25; No. 2 foundry, $13.25 to $13.75; No. 3 foundry, $12.75 to $13.25; No. 4 foundry, $12.25 to $12.75.

Finished Iron and Steel.—The structural material market for the week was fairly active. No orders of magnitude are reported, but small contracts closed made up a good tonnage. The American Bridge Co. booked two orders calling for about 1,400 tons for schools in this city, and specifications in the same direction are out that will require about 3,500 tons. It also got an order for 700 tons for a new building at Los Angeles, Cal., and one for 1,000 tons for a new addition to the Bellevue-Stratford Hotel, Philadelphia. Orders in prospect are 4,500 tons for the Chicago & Northwestern Railway building in Chicago, and for 1,200 for the Maryland Casualty Co. building, in Baltimore. Some old propositions, like the 9,000 tons for the Printers' and Publishers' building in this city are said to be nearer closing, but confidence that they will be closed is not strong. The building industry in this city is peaceful, but contractors are not sure that it will remain so. Plate mills were complaining of a scarcity of orders during the past week. One contract closed by the Carnegie Steel Co. a few days ago was given by the Railway Steel & Spring Co. for 700 tons of circles for car work. The spring trade in sheets has opened poorly, and prices are slightly lower. Considerable business is reported as being hung up. Bars are only fairly strong. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; fire-box, ordinary, 1.94½c to 2c; refined iron bars, 1.50c to 1.55c; soft steel bars, 1.50c to 1.55c; steel sheets, in carloads, New York. No. 28 black, 2.45c to 2.50c; galvanized, 3.45c to 3.50c.

PHILADELPHIA.

April 19.

Pig iron for prompt delivery is scarce on account of heavy buying during the past four weeks, but buyers of pig iron and also of finished material are not placing orders freely and a feeling of uncertainty prevails. Business seems to require favorable developments to prevent a return of dull times and low prices.

Pig Iron.—Prices are firm, but sales are light, being confined to small quantities for immediate use. Furnaces are well sold up for the first half, but would like very much to take orders for the third and fourth quarters. We quote: No. 1 X foundry, $15.75 to $16.00; No. 2 X foundry, $15.00 to $15.25; No. 2 plain, $14.25 to $14.75; gray forge, $13.25 to $13.75; basic, $13.75 to $14.00; Southern No. 2 X, $14.25 to $14.50.

Finished Material.—Conditions have not improved during the past week. Orders are not developing as rapidly as was expected and much more business is needed to keep the mills busy. Plates show some improvement. We quote: Best refined bar iron, delivered, 1.48½c to 1.55c; tank plates, delivered, 1.73½c; angles, delivered, 1.50c to 1.55c; beams and channels, 15 inches and over, delivered, 1.73½c.

Old Material.—The market is weaker. Stock is being freely offered and buyers assert that prices will fall. Hence few orders are being placed. We quote: Old steel rails, delivered, $15.00 to $15.50; miscellaneous heavy steel, delivered, $14.00 to $15.00; low phosphorus scrap, delivered, $18.00 to $18.50; old steel axles, delivered, $18.00 to $19.00; old iron axles, delivered, $21.50 to $22.25; old iron rails, delivered, $18.50 to $19.00; old car wheels, delivered, $13.50 to $14.00; choice railroad No. 1 wrought, delivered, $17.50 to $18.00; country scrap, delivered, $16.00 to $17.00; machinery cast, delivered, $13.50 to $14.00; No. 2 light scrap (forge), delivered, $12.00 to $13.00; No. 2 light scrap (ordinary), delivered, $10.50 to $11.00; Axle turnings, delivered, $10.50 to $11.00; wrought turnings, delivered, $9.75 to $10.20; cast borings, delivered, $7.50 to $8.00; stove plate, delivered, $12.00 to $12.50; wrought iron pipe, delivered, $13.00 to $13.50; boiler punchings, delivered, $15.50 to $16.50.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, NO. 150 NASSAU ST., April 19.

Pig Tin.—The weakness in the market noted in our last report continues, but prices show no appreciable change. Arrivals have been heavy, and these coupled with a falling off in the demand, have brought about easier conditions, with an outlook that is not promising. The London market is lower. Closing prices at the Metal Exchange today, follow: Spot and April, 27¾c to 28c; May, 27⅝c to 27⅞c. London's closings today follow: Spot, £126 10s; futures, £126 2s 6d. Arrivals at Atlantic ports for the month to date amount to 3,460 tons, with 2,194 tons afloat.

Copper.—While the week has passed with no change in prices, the demand shows a tendency to fall off. Still trade conditions on the whole are good, and if exports don't diminish the market is thought to augur well for stability for a little while anyway. During the week the London market declined considerably, and the bullish feeling lost some of its strength. Closing prices at the Metal Exchange today follow: Lake, 13⅜c to 13⅝c; electrolytic, 13⅜c to 13¼c; casting, 12⅞c to 13⅛c. London's closings today follow: Spot, £57 17s 6d; futures, £57 12s 6d. Exports for the month to date aggregate 6,799 tons against 7,388 tons for a corresponding period last year.

Lead.—Is steady and unchanged at 4.60c to 4.65c. St. Louis is weaker at 4.40c. London is lower at £12 5s.

Spelter.—The metal is firmly held at 5.25c to 5.30c. St. Louis is unchanged at 5.05c, and London is higher at £22 7s 6d.

Antimony.—Prices are unchanged, Cookson's being 7¾c to 8c; Hallett's, 7¼c to 7½c, and other grades, 6¼c to 6½c.

Quicksilver.—We quote $46 per flask of 76½ pounds in lots of 100 flasks. London is £8 5s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, April 19.

Copper has advanced half a cent, and Lake is now quoted 13½c for carload lots, and 14c to 14½c for smaller lots. Casting copper, 13¼c, carloads, and 13¾c to 14c for smaller quantities. Buyers are sparing in their orders, purchasing in amounts sufficient to tide them over several weeks. Pig tin is weaker, and is now quoted 20c to 30c, according to quantity. Spelter is selling at 5⅛c for carloads, and 5¼c to 5½c for less than carload lots. Sheet zinc, 5.75c per lb. in car lots of 600-lb. casks, and 5.95c to 6c for less than carload lots. Pig lead, 4.45c, carloads, and 4.50c to 4.55c in lesser amounts. Antimony, 8½c to 8¾c for Cookson's, and 7¼c to 7½c for Hallett's. Nickel, 45c to 60c, according to amount. Demand for old metals is better and prices are somewhat firmer. Slightly better prices than the following quotations have been obtained in some cases, though they represent a fair idea of the local market. We quote as follows: Copper wire and heavy, 11¼c; copper bottoms, 10½c; copper clips, 11½c; red brass, 10¼c; yellow brass (heavy), 8c; yellow brass borings, 6¼c; red brass borings, 8¼c; light brass, 5¾c; pipe lead, 4c; tea lead, 3.90c.

Lake Superior Iron Mines.

At its Aragon mine, Norway, Mich., the Oliver Iron Mining Co. is putting in what is said to be the finest pneumatic railway plant ever installed in a Lake Superior mine. The entire underground haulage system will be by compressed air.

It is expected that the combination washing and screening system to part the sand from the ore will be installed on the western Mesabi range by the Canisteo Mining Co. for two shafts which it is sinking.

Preparations for the resumption of active mining operations at the Winnifred mine are now being made. The Winnifred is one of the mines that was placed in operation in the Hibbing district last season when it shipped 39,179 tons. The Winnifred and Laura mines were taken over from the Fay Exploration Co. by the Winnifred Iron Mining Co., of Duluth, of which A. M. Chisholm is the secretary and treasurer.

Although excitement in regard to iron ore deposits in Aitkin county, Minn., has quieted down, exploration work is still going on. Drilling has been in progress all winter, even during the extreme cold period. H. B. Ayers, of Kimberley, Minn., is the director of operations in the field. He was formerly connected with the government geological survey.

On Tuesday, April 19, Judge Frazer issued the formal decree at Pittsburg, perpetually enjoining the Jones & Laughlin Steel Co. from emitting clouds of ore dust in the operation of its furnaces on Second avenue, causing damage to the property in the vicinity. On Monday the Supreme Court of Pennsylvania refused the motion of the attorneys for the defendants for a reargument of the case and the issuance of the formal decree immediately followed. Officials of the company state that every effort will be made to obey the order of the court, and as stated before the number of slips at these furnaces have been few in the past three or four months.

The catchers employed at the South Sharon, Pa., plant of the American Sheet & Tin Plate Co. went on a strike this week, refusing to accept the cut of 18 percent in their wages. The entire plant has been shut down in consequence.

New lodges of the Amalgamated Association of Iron, Steel and Tin Workers, have been organized at Harrisburg, Pa., Lebanon, Pa., and Columbia, Pa. The association's strength in the East is growing, but no Eastern scale will be adopted at the coming Cleveland convention of the association, as it is believed that the organization is not yet strong enough to enforce a general scale.

U. S. STEEL CORPORATION'S ANNUAL MEETING.

The third annual meeting of the stockholders of the United States Steel Corporation was held in Hoboken, N. J., April 18.

The meeting was called to order by Judge E. H. Gary, chairman of the board of directors, the other officers of the company present being Francis Lynde Stetson, general counsel; Richard Trimble, secretary and treasurer, and William J. Filbert, controller. Oliver Wren was present as the representative of Mr. Schwab's interest. About 75 other stockholders were present.

Judge Gary announced the proxy committee, consisting of Robert Bacon, Henry C. Frick, Elbert H. Gary, Francis H. Peabody and Norman B. Ream, represented 4,680,204 shares as follows: 2,023,490 preferred and 2,656,714 common, which is more than 54 percent of the total amount of stock. There were also represented by attorneys 8,935 shares preferred and 32,568 shares common.

The directors whose terms expired were re-elected and W. E. Corey and John F. Dryden were elected to fill vacancies on the board. In addition to this, the stockholders voted favorably upon the reconstruction of the by-laws by which the executive committee is to pass out of existence and its chairman become chairman of the board of directors. The work of the executive committee is to be done by the officers and the finance committee. The ballots handed around to the shareholders read as follows:

The undersigned votes the number of shares noted in the subscription hereto as follows:

(1) In favor of approving and ratifying all contracts, acts, by-laws, proceedings, elections and appointments by the board of directors or executive committee or the finance committee since the second annual meeting of the stockholders of the corporation on April 20, 1903, as set forth in the minutes of the board of directors, or of the executive committee or of the finance committee, or in the second annual report.

(2) In favor of ratifying the election Mr. W. E. Corey and Mr. John F. Dryden as directors of the first class for the three years ending in 1905 in the place and stead of Mr. Alfred Clifford, resigned, and Mr. Abram S. Hewitt, deceased, respectively, and the election of Mr. Henry Phipps as a director of the third class for the three years ending 1904, in place and stead of Mr. John D. Rockefeller, resigned.

(3) For the following named persons as directors of the third class for the three years ending 1907: J. Pierpont Morgan, Henry H. Rogers, Elbert H. Cary, George W. Perkins, Charles M. Schwab, Henry Phipps, Edmund C. Converse, James Galey.

(4) For Messrs. Price, Waterhouse & Co., as independent auditors to audit the books and accounts of the corporation at the close of the fiscal year ending December 31, 1904.

J. B. Allee, representing the estate of W. H. Allee, moved that all persons in the room not interested as stockholders or able to furnish adequate reasons for their presence, be asked to withdraw. Judge Gary replied that the corporation had nothing whatever to conceal, and was glad that anyone with any interest whatever in the corporation should be present.

Mr. Allee arose to explain that his only reason for making the motion was to avoid having anyone not a stockholder engage in discussion. Mr. Allee added he didn't want all of the discussion put in the hands of the officers. To this Mr. Stetson replied that he was quite sure all of the officers were enthusiastic stockholders. When Mr. Allee's motion was put, it was lost.

Mr. Sleicher, of the American Ice Co., moved that if any material changes were to be made in the by-laws they should be explained to the shareholders before the vote was taken. This precipitated discussion, some of the stockholders asking many questions. These were answered with the statement that those shareholders who wished could readily ascertain the character of the changes by reading the old by-laws and then the new ones and also by reference to the circular announcing the changes, which had been sent to the stockholders a month and a half ago. After this discussion, the changes in the by-laws were approved by a practically unanimous vote.

Mr. Allee then introduced a resolution creating a committee of 15 to be selected from the stockholders present to make a thorough investigation of the affairs of the corporation with the particular view of ascertaining the reason for the depreciation of the stock and to determine whether the corporation had been conducted in a manner most advantageous to shareholders. Mr. Allee said in part that the stock had suffered a loss of 40 points, and that while it is believed by people of the financial world that the stock would eventually go back to its proper value, still that might be a matter of several years.

"The question arises," he added, "is the present value of the stock due to the methods of those conducting the company in the last three years? I think we should know why the conversion program was carried through two years ago, which so affected the value of the stock. It involved the payment of large sums in commissions. I do not know whether those who carried the plan through deserved such commissions. I don't want to use such a word as misappropriation in this connection. I offer my resolution to ascertain how many stockholders are dissatisfied with the present methods."

Mr. Stetson said that at the special meeting of the corporation stockholders in 1902, and at the annual meeting in 1903 the plans of the company had been completely discussed and approved. Two other stockholders declared themselves perfectly satisfied with the present state of affairs and the present management. Judge Gary then put the Allee resolution to a vote, saying it must be considered as a stock vote, and not to be counted by the number of individuals voting for or against it. The resolution was lost by unanimous vote, Mr. Allee himself, in his excitement, neglecting to cast his ballot.

EASTERN PENNSYLVANIA.

HARRISBURG, Pa., April 19.—Orders have been issued for the starting of a number of mills and furnaces east of the Susquehanna river, some of which have been idle for the greater part of the winter. Others will go on more extensively because of the improvement in business.

The American Bridge Co.'s huge plant at Pencoyd is apparently booked for considerable activity this summer. Orders have been given to run several of the open-hearth steel furnaces this month and in May more furnaces and several mills will be started up.

At Columbia the Susquehanna Iron & Steel Co. is running its pipe and part of the rolling mill plant. The furnaces are idle.

The Reading Iron Co. is arranging to rebuild more of its works in Reading. Within the next year the Scott works and one of the large rolling mills will be remodeled and the mills modernized.

The old Glen rolling mill at Allentown has been sold and will be dismantled.

The Lackawanna Iron & Steel Co. is starting its furnaces in the Lebanon district after a long idleness. The Thomas Iron Co. will start another furnace at Lock Ridge, according to reports. Most of the company's stacks are running.

The American Iron & Steel Mfg. Co. has had placed by a syndicate of fire insurance companies a policy for $1,000,000 on its Lebanon works.

Six furnaces, all but one in Dauphin county, are in operation. The output is being used chiefly in Harrisburg and Steelton most of the mills being at work. The Central Iron & Steel Co. will start one of its new open-hearth steel mills within a few weeks.

It is reliably stated that the Carlisle chain works will be rebuilt, local capital being interested.

Shippensburg people have organized a $50,000 company to take in the Domestic engine works of Hagerstown and the Etter Pump Works of Greencastle. The works will be united at Shippensburg.

The Duncannon Iron Co., which suffered somewhat from fire and flood this winter, is again running full time.

It is stated that a plant to cost nearly half a million dollars will be established at Enola, just across the Susquehanna from this place for the manufacture of contractors' and small road locomotives. Men prominent in the Pennsylvania railroad are said to be interested. This town is the site of the Pennsylvania's new classification yards.

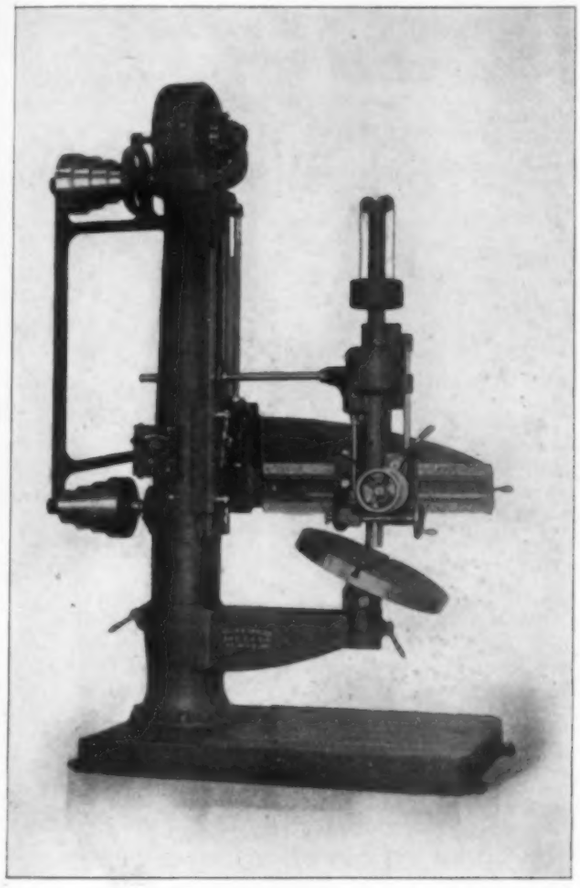
The State Board of Public Buildings and Grounds has named engineers to draw plans for ten bridges carried away by flood this spring. The bids will be advertised in the course of a month. About a dozen additional bids will be advertised for later in the year as the recent floods caused immense damage to bridges which the State will have to replace.

The American Pig Iron Storage Warrant Co., of New York, has been advised that its warrants have been formally listed on the Pittsburg stock exchange.

NEW MOTOR DRIVEN RADIAL DRILL.

The William E. Gang Co., of Cincinnati, has just shipped seven of its new motor-driven radial drills equipped with 5-h. p. Crocker-Wheeler constant speed motors to the Smeeth Copper & Bronze Co., of Chicago. The motor pinion meshes with the cast iron gear which is secured to the upper shaft to which is also fastened the cone pulley. A three-inch belt transmits the motion to the lower cone, and by bevel gears in the column to the shaft drives the head. One lever on the head controls all the movements of the spindle—starting, stopping, reversing and engaging the back gears. This particular shipment of drills was furnished with a circular tilting table.

The frame of the machine is composed of the base, stump, column, radial arm, head, table arm and table, and each part is so proportioned as to insure the greatest rigidity combined with ease and convenience of manipulation. The machine is unique in some of its features, pleasing in appearance, and well adapted to the requirements of an every-



A NEW MOTOR DRIVEN RADIAL DRILL.

day shop tool. The method of transmitting the belt power to the spindle is simple and direct, having few parts and little friction. The base is deep, well ribbed, and of ample size and weight. The stump is bored to receive the column, turned on the outside to fit the table arm and securely bolted to the base.

The column is of box section, generously proportioned, and is turned to fit in the stump. It is carried on a ball bearing and a slight movement of a lever secures the column rigidly in the stump, without additional strain on the ball bearing. The upper end of the column has a flat face for the arm, is planed with dovetail flanges at edges of arm seat, and back of these again are flat seats for the clamps which hold the radial arm in position and take up any wear incident to raising and lowering the arm. The clamps alone are not depended upon to bind the arm in position, but two screws with handles attached working in nuts beveled to fit edges of arm seat, clamp the arm and align it vertically. Any tendency to spring the column in clamping the arm is overcome by fitting a square gib in the opening provided for vertical movement of the horizontal driving shaft.

The radial arm is also of box section, well ribbed, and is rapidly raised and lowered by means of a stationary screw, revolving nut and tumbler gears, the movement being controlled by the small lever shown directly between the clamping screws. The spindle head or saddle, for which the balance of the machine merely acts as a support and means of transmitting the power, has been designed to embody those features known to be essential to the rapid production of accurate work.

It was the aim of the designer to concentrate all heavy stress of driving at the spindle; therefore three large gears —for ordinary drilling, for heavy boring and tapping, and for reverse in tapping—were placed directly on the spindle, the back gears being just behind them. The upper part of the head was made to entirely surround these driving gears, thus eliminating all attached bearings, with their added weight and tendency to become loose. This construction also affords an excellent protection to the working parts as well as insuring the workman against injury. The spindle controlling lever, which starts, stops, reverses the spindle and engages and disengages the back gears, is directly on the front of the head, always convenient to the operator in his natural position. The traverse of the head is likewise provided for by the large handwheel operating through rack and pinion. Three rates of feed—.009, .012, .015 inch per turn of spindle—are provided and any desired change is obtained instantly by turning the knurled knob at the left of the head, while the machine is running. The feed may be released either by means of the knurled knob at the left of the feed-worm shaft or by the ball handle at the front of the head. This handle is also used for quick traverse of the spindle. Any one of six styles of table can be furnished with this machine—round table mounted on arm, plain square table, plain swiveling, square table, worm swiveling square table, plain box table, swiveling box table. A round table may also be mounted on any style of square table, and is provided with a device for locking it securely in position. By means of cone pulleys, as ordinarily equipped, the machine has eight rates of spindle speed. Steel gears are used where they are found to be necessary, and the speed of the driving cones is maintained up to the head, where all multiplication of power is made.

Steam Turbine Power Plant for Boston Navy Yard.

The United States Navy, Department of Yards and Docks, is introducing Westinghouse-Parsons steam turbines for furnishing power for lighting the buildings and yards, and power for operating dry dock pumps and miscellaneous machinery at the Charlestown Navy Yard, Boston, Mass., and for the present, one generating unit of 750-k. w. capacity will be placed in service. This turbine will be of the new short-barreled type and is now under construction at Pittsburg. A Worthington surface condenser will be employed, using salt water for circulation. The condensers will be located between the foundations, which consist of concrete piers. A running vacuum of 28 inches will be secured through the aid of a dry air pump. Steam will be furnished at 150 lbs. pressure by Babcock & Wilcox boilers in units of 350 h. p., equipped with Roney mechanical stokers. Coil superheaters in the boiler settings will furnish to the turbine a superheat of about 100 degrees F. The boiler house will be equipped with a complete outfit of coal and ash handling machinery. The turbine plant will supply 3-phase alternating current at 2,300 volts, this voltage being used for general distribution and for direct use in larger motors, while for lighting, lower voltage will be provided by transformation. The turbine generator will be served by a 37½-k. w. Westinghouse compound exciter unit.

The Great Lakes Engineering Works, Detroit, Mich., have received a contract from the Michigan Central railroad for a car ferry for Detroit river service. The new boat will be of the most modern type, especially adapted for working through the heaviest ice. It will be 328 ft. long over all, 64 ft. beam and 19½ ft. deep. The cost will be $315,000.

MANUFACTURE AND USE OF HIGH SPEED STEEL.

A lecture on the "Manufacture and Use of High-Speed Steel" was delivered March 4 by J. M. Gledhill, of the firm of Sir W. G. Armstrong, Whitworth & Co., of Newcastle and Manchester, Eng., to the members of the Coventry Engineering Society, Coventry, Eng., Alfred Herbert, of Alfred Herbert, Ltd., presiding. The address was fully illustrated by large diagrams and lantern slides, also fractures of bars, showing the different tempers and the effect on them of various heat treatments. Specimens of the important alloys used in the manufacture, such as tungsten, vanadium and chromium, were also shown, which were very interesting to those present. The present price of these alloys indicated the impossibility of producing high-speed steel at low prices, having regard to the costly nature of the materials. Many samples of work produced by high-speed steel were also shown, together with high-speed twist drills and milling cutters made from "A. W." steel. Most of the specimens of work were remarkable for excellent finish and accuracy.

As many people find themselves unable to attain results equal to those obtained in special trials, the paper was accompanied by an appendix, giving the speeds and feeds which are in daily operation in various plants, embracing a fairly wide circle of representative firms. These results will undoubtedly prove interesting to all those engaged in productive work, especially at the present time, when economy of production is so live a question.

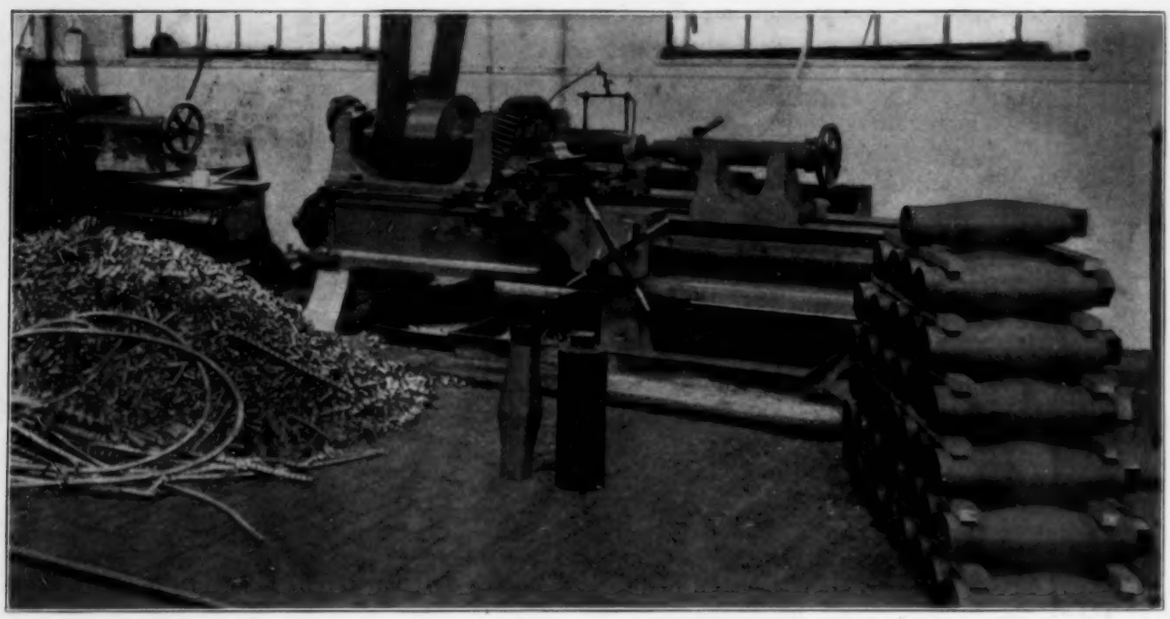


FIG. 1.—TURNING ARMOR PLATE BOLTS AT ARMSTRONG, WHITWORTH PLANT. ONE DAY'S WORK SHOWN. FORTY BOLTS TURNED AT CUTTING SPEED OF 152 FEET PER MINUTE, ¾ INCH DEPTH OF CUT AND $\frac{1}{32}$-INCH FEED. METAL REMOVED IN ONE DAY, 2,480 POUNDS. "A. W." TOOLS.

The Manufacture of Crucible Steel.

The address briefly presented an account of the manufacture of ordinary crucible cast steel, the grades of cemented steels and the making of the crucibles. The latter work is of great importance and Mr. Gledhill said: "One of the first considerations in the melting of crucible steel is the necessity of ensuring the crucibles used to be of the perfect quality requisite to withstand the very high temperatures required to melt the iron and various alloys, and especially is this the case in the melting of the ingredients of high-speed steels, which require extremely high temperatures to thoroughly assimilate and mix themselves into a homogeneous whole. This difficulty is only overcome by taking great care in their manufacture and by utilizing only the finest qualities obtainable of the various materials." The various fireclays and compounds are carefully weighed, mixed and trodden with the bare feet and balled, so as to thoroughly consolidate the mixture, and free it from air spaces necessary to obtain the correct homogeneity required. The compound is then made into crucibles of the desired shapes and sizes, by hand, with the plug and flask. "The operation of treading the clay with the bare feet may appear to the uninitiated to be a crude one, but mechanical ingenuity has so far failed to provide an equivalent substitute, trodden clay having been found to be more satisfactory in every way than clay treated mechanically." To manufacture crucibles, including their formation and drying, occupies from three to six weeks, according to size, so that with the high cost of the plumbago and other materials, also the length of time in completion, the item of plumbago crucibles is an expensive one in crucible steel manufacture. The plumbago crucibles made up generally last in the case of steel melting from eight to ten rounds; that is, they can be used eight to ten times before being cast aside, while the plumbago crucible used by Mr. Gledhill's firm for the melting of brass and gun metal and other anologous alloys will last as many as 36 to 40 rounds.

Proceeding now to the manufacture of crucible cast steel, it is necessary to first carefully select the blister or cemented bar according to the temper of steel required, and this having been done, the bar is broken up into small pieces suitable for charging into the crucibles, about 56 pounds of broken bar being generally charged into each, together with the alloys and other necessary substances for the particular temper of steel it is desired to make. Before the crucible is put into the melting furnace it has a preparatory annealing in a separate furnace, which is placed close to the melting furnace, so that the crucible is transferred from the former to the latter in a heated condition; this being done to prevent the too sudden heating of the crucible, for were it transferred directly into the melting furnace, it would be liable to fracture. The necessary charges being weighed out, are now ready for putting into the crucibles, and are charged therein through a long funnel or bell-mouth tube. The melting holes are either heated by coke or by means of gas in a regenerative furnace, each division of such a gas furnace holding six or more crucibles. The process of melting occupies anything from 3 to 4½ hours, according to the brand of steel being worked—the higher grade brands, such as high-speed steels, taking a longer time to melt and thoroughly mix the various alloys they contain. The skill of the chemists and leading melters is now brought to bear on the important operation of melting, and the degree of heat of the furnace is regulated by them, the contents of the crucibles being inspected from time to time, so as to decide exactly when they are thoroughly mixed together. It is only by long

and actual experience in melting that the correct condition can be ascertained as to when the steel is properly melted and is just ready for pulling out and casting into ingot form. Before withdrawing the crucible containing the molten steel from the holes, which is done by a man called a "puller-out," "he takes the precaution to envelop his legs with wrappers saturated with water, so as to prevent his apparel taking fire; but, should he do so, there is every convenience at hand, as a tank is provided close to the pot-holes, into which he can plunge and 'extinguish himself.'"

The speaker gave the ruling prices of various constituents of steel alloys as follows: Vanadium costs 40s. 0d. ($10.00) per lb., or £4,480 per ton; molybdenum costs 6s. 0d. ($1.50) per lb., or £672 per ton; tungsten costs 2s. 6d. ($0.62) per lb., or £280 per ton; nickel costs 1s. 6d. ($0.31) per lb., or £168 per ton. He added that where large percentages of such alloys are used, high-class crucible tool steel is naturally a costly production. A few particulars of some of these alloys were also given.

Old Records far Outdistanced.

The rapid development of high-speed steel during the last few years, the speaker said, has revolutionized alike the theories and treatment of tool steel, as well as its uses in our engineering shops. We have the paradoxical condition that whereas it was formerly necessary in treating self-hardening steel that every care should be taken not to overheat it, that is to exceed temperature of between 1,500 and 1,600 degrees Fah., else its cutting power would be seriously impaired, now it is one of the essential conditions to heat up the high-speed steel very considerably above these temperatures; in fact, to so high a temperature as 2,200 or 2,300 degrees Fah., a temperature which would practically melt pig iron. This is a truly remarkable paradox, and forms one of the most striking phenomena in the recent history of steel treatment.

"Partly as a result of this it is now possible with the "A. W." high-speed steel to turn and machine steel at a rate up to 400 feet per minute, and also to drill cast-iron at 25 inches per minute! Only a comparatively short time back with the ordinary crucible steels a cutting speed of 30 to 50 feet per minute was more like the limit.

"It is to Messrs. Taylor & White, of America, that the credit of initiating high-speed cutting is due. It will, however, not be denied that the improvement and development beyond their process that has taken place during the past few years is due to our own country, for whereas in the Taylor-White process their steel could not be sent out in bars, but only in the form of finished tools specially treated on the nose only, now high-speed steed manufactured in this country is delivered to users in the ordinary way, and futher, its forging and treatment is absolutely simple, in fact, simpler, and is accompanied by less risk than in the case of ordinary tool steel. In the case of hardening the point of the tool on the American plan, the author can recall a somewhat amusing story. One of such tools was taken and offered for sale to a certain works in the North of England, and the seller was enlarging on its wonderful properties and stating how cheap it was at 3s. (75 cents) per pound. The intending purchaser asked, 'But how shall we re-forge and re-harden the point of the tool?' 'Oh,' was the reply, 'you will have to send it back to our works when the point is worn off, and we will re-treat the tool and return it to you with another point.' 'Oh, indeed,' said the buyer; 'now look here, I do not object to giving you your price for that little bit of the nose end, but as to the rest of the stuff behind it, well, say 1½d. (3 cents) per pound for that!'

"It will, therefore, be seen that the very exceptional treatment required in preparing these tools precluded their adoption and use commerically, and it is a remarkable fact that the English manufacturer is now exporting high-speed steel on a large scale to America.

"On the question of heat treatment of steel, it is indeed remarkable what divergent effects different temperatures of heating produce on its molecular structure. To look at a bar of steel lying on the ground one can scarcely believe that it contains as much mystery and complexity as human nature itself. For example, a bar, if it be heated to a certain degree of temperature, may be left in such a molecular condition as to be considered useless and thrown aside as such. Heated up a little higher, its structure is completely altered, the bar attains a good condition, and is capable of standing great tenacity and ductility. Again, if we take another bar of steel of certain composition, we may heat it to a certain temperature when its molecular structure will be such that it can be cut and shaped into any desired form; but go a step further, and heat this bar to a still higher temperature, and rapidly cool it, its molecular condition has again changed. The bar has become intensely hard, and is capable of cutting softer steels—it has, in fact, become tool-steel. If the steel is heated to a still higher temperature, it is in ordinary phraseology termed burnt, and if you then rapidly cool it, the steel is still hard, but its structure becomes granular, and therefore very brittle. Its tough nature and cutting powers have become impaired; in fact, its molecular structure is again changed.

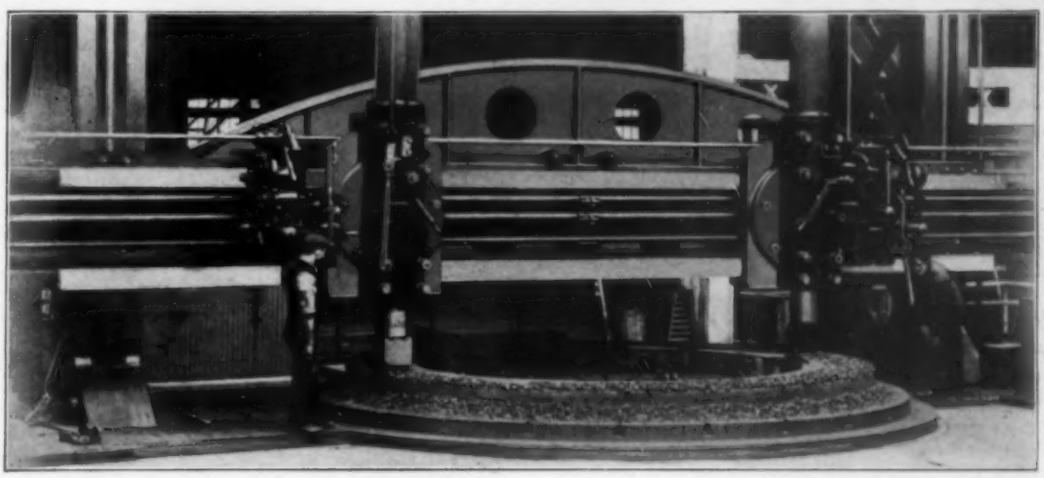


FIG. 2.—BORING MILL AT BRITISH WESTINGHOUSE PLANT. CUTTING SPEED 40 FEET PER MINUTE. DEPTH OF CUT 1 INCH, FEED $\frac{1}{8}$ INCH IN CAST IRON. "A. W." TOOLS.

Economy of High Cutting Speeds.

"Having dwelt on the manufacture of crucible steel, it will now be interesting to refer to the use of it, and more particularly with special reference to the use of high-speed steel and of some actual practical work done with it. It has been stated by some that there is not much advantage in its use, but it is easy to prove very greatly to the contrary. There is nothing like facts in proof of statements, and the author does not only give the results of his own firm, but is greatly indebted to many important engineering firms all over the country using 'A. W.' high-speed steel for much information as to actual daily practice now existing in their

workshops. It is also proved beyond doubt that it is distinctly economical to use high cutting speeds, this being clearly shown in the conclusions arrived at by the Manchester Association of Engineers as a result of an exhaustive series of tests and trials with high-speed tool steel. These trials extended over a period of many months and were carefully carried out under the superintendence of Dr. Nicolson, professor of engineering at the Manchester School of Technology, together with a specially appointed committee, and the tests were of a very complete and detailed character.

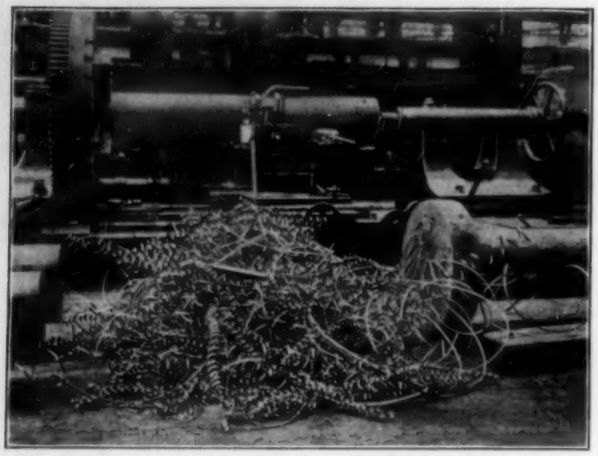


FIG. 3.—TURNING STEEL FORGING AT ARMSTRONG, WHITWORTH CO.'S PLANT IN 80-INCH LATHE. CUTTING SPEED 150 FEET PER MINUTE. DEPTH OF CUT $\frac{5}{16}$-INCH, FEED $\frac{1}{16}$-INCH. TIME CUTTING 45 MINUTES.

"Briefly, some of the results arrived at by this committee were that, although more power is naturally required to take off metal at a high speed than at a low speed, the increase of that power is quite out of proportion to the large extra amount of work done by the high-speed cutting. This, one would say, is an important point for all users of steel to bear in mind. Of course, it cannot now be denied that machine tools which were fully equal to the cutting power of the old kinds of tool steels are now quite unequal to the capabilities of the high-speed steel—not in driving power alone, but in the absence of rigidity and general strength of working parts for obtaining the utmost work that the high-speed steel is capable of performing. Purchasers of machine tools will doubtless, in obtaining new designs, note this, so that machines and tool steels which are going to be used in them should be, so to speak, approximately equated. Want of power and strength is undoubtedly being realized, and rapid strides are being made by the leading tool makers to bring their designs into line with the steel.

Some Records.

"A proof of this might here be given: We had at our works an ordinary 12-inch lathe, turning armor plate bolts of from 4 to 5 inches diameter, and we thought we did wonderfully well in turning them at a cutting speed of 80 feet per minute. We found the tool at the end of the day's work to be practically as good as at the commencement, and this caused an increase of speed to be suggested. It was found, however, that the lathe had not sufficient power to admit of any increase of speed, and yet it was felt beyond doubt that if we could only get the required power we could run at double the cutting speed. We therefore designed a special lathe with an increased width of belt from 4 to 7½ inches width and an increase of the belt velocity of 400 feet per minute. The lathe was duly put to work and we immediately began to cut at a speed of 152 feet per minute, the same depth of cut and feed being maintained as when we were cutting at 80 feet per minute, while the tool, which is 1¼ inches square in section, lasts from 7 to 8 hours without requiring to be re-ground. So much then for bringing up our machines to the limit of power of the steels. One day's work is shown by the side of the lathe in Fig. 1. It will be seen that the plain rolled bar in the back is shown and the number of bolts made from such pieces in a period of 10 hours by a 1¼-inch square tool. The bolts machined in this time are 40 in number, as against a production of only 8 when using ordinary self-hardening steel. The following are the actual cutting speeds and feeds on these bolts: Cutting speed, 152 feet per minute; depth of cut, ¾ inch; feed, 32 cuts per minute; actual metal removed, 62 pounds per bolt, or 2,480 pounds in the day of 10 hours.

"Another excellent example of high-speed cutting by 'A. W.' steel may be cited: Turning oil-hardened gun metal having a tensile strength of 40 to 45 tons per square inch, the cutting speed was 50 feet per minute, 11 cuts per inch, while the depth of cuts varies from 3-16 to 11-16, the tool cutting 9 hours without interruption.

"There is another point raised by some users of high-speed steel, and that is as to its having been found brittle. This, however, is not the case if the steel is properly hardened, and the hardening confined to the cutting area, and proper support be given to the tools when fixed in the machine. One example may be given as showing the great pressure resisting powers of high-speed steel. An 'A. W.' tool 1¼ inches square section, cutting a steel forging at 25 feet per minute cutting speed, 7-16 inch depth of cut, with a feed of ⅜ inch per revolution, and removing 14¼ pounds of metal per minute, 855 pounds per hour, withstood easily the very great pressure which such heavy cutting as this would put upon it, and without showing any signs of weakness. In practice for heavy cutting of this nature a tool of about 2 inches square section would be used; so that it adds further proof when looking at the small section of the tool employed. It may be added that a much higher speed than 25 feet per minute could have been done if the lathe had had sufficient driving power.

"Another example of the resistance of high-speed steel to shock is shown by the 'A. W.' tool lying on the table. This tool of 1¼ inches square section has been used for cutting the top and bottom faces of the webs of a large three-throw crank shaft, and the tool has worked for 40 hours without being re-ground, the cutting speed being 40 feet per minute, depth of cut ⅝ inch, and feed 32 cuts per inch, and of course it will be understood that the tool was not cutting continuously, but the web was coming on the tool intermittently.

"Many other examples might be given of our own practice and that of the great Elswick Works which are using 'A. W.' high-speed on a very extensive scale, but it will suffice to annex one or two standard examples, and then to give in the attached appendix what is being done in independent establishments. Turning a cast iron flywheel, 12 feet diameter, 12 inches face; cutting speed, 35 feet; depth of cut, ¾

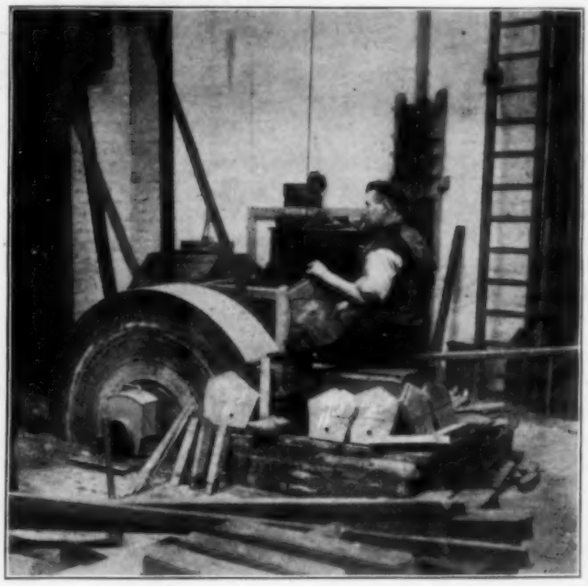


FIG. 4.—GRINDING HIGH SPEED TOOLS IN THE ARMSTRONG, WHITWORTH PLANT. WORKMAN SITS ON A BOARD SUSPENDED AT ONE END BY ROPE FROM CEILING. THE OTHER END OF BOARD PRESSES THE WORK AGAINST THE GRINDSTONE.

inch; feeds 4 cuts per inch. (This wheel had barring holes in the center about 8 inches pitch.)

"In addition to using high-speed steel for turning, planing, slotting and boring tools, it can also be most advantageously used for milling cutters, twist drills, taps and screwing dies, reamers, wire drawing, tube expanding, etc. Correspondingly increased speeds can also be obtained with high-speed steel when turning hard materials like chrome steel for projectiles, old railway wheel tyres, hard cast iron, etc.

"A pair of straddle mills, 7 inches diameter and 1½ inches wide, made of 'A. W.' steel, were used to cut 2 ⊥ (an inverted Tee section) section from bars of forged steel, 7 feet 3 inches in length, each cutter taking a cut 1½ inches deep, and 9-16 inch wide, at a feed of 1⅛ inches per minute, the cutting feed being 75.5 feet per minute. After milling 18 of these bars—a total length of 130.5 lineal feet, and cutting continuously for 23 hours and removing 380 pounds each, the cutters were quite uninjured; also the screw-threads on the armor-plate bolts previously referred to (Fig. 1) are milled at a cutting speed of 330 feet per minute, with a feed of 15 inches per minute.

"Another record may also be mentioned. The cutters in question were 4 inches in diameter and 2 inches wide, and were employed on surfacing work in crucible cast steel, taking a cut 1-32 inch deep at a feed of 1½ inches per minute, the cutting speed being 90 feet per minute. These cutters have cut continuously for 60 hours without being re-ground, whereas, when using cutters made of ordinary crucible steel at a slower speed, it was necessary to grind them every six hours.

Hardening and Tempering Cutters.

"It will, no doubt, be interesting at this stage to give the most suitable processes for the heating, hardening and tempering of these cutters. It is advisable to first fill up the hole and machined parts which it is required to keep to size for fitting on the arbor and keys, with common fireclay. Then place the cutters into a cold muffle furnace. Heat up the furnace gradually to a red heat. Then transfer the cutters to another furnace already heated to a very bright yellow, about 2,200 degrees Fah., and allow the cutter to remain in until the teeth or cutting edges are heated to the same temperature as the furnace. Place the cutters under the air blast until the temperature is lowered just below visible red, that is 1,000 degrees Fah. Remove cutter from the blast and place into a pan containing tallow, and then heat up the pan to a temperature ranging from 500 to 600 degrees Fah. Take out and allow to cool gradually, keeping away from cold draughts.

"Some results obtained with the brand of steel which is known as 'T. Y. R.,' which is an offspring of the 'A. W.,' and is specially made for machining hard materials, viz., nickel, chrome and high carbon steels, close grained cast iron and malleable castings, may be cited. This brand of steel working on chrome steel projectiles 12 inches in diameter machined 20 and was cutting 14½ hours before it required re-grinding. Cutting speed 17 feet per minute; depth of cut, ¼ inch; feed, 12 cuts per inch.

Results with Twist Drills.

"A development of high-speed work, which was not at first looked for, has been in the manufacture and use of twist drills. Many attempts have been made to produce twist drills from ordinary self-hardening steel with usually very indifferent success. Now, however, twist drills made of high-speed steel are a practical success, and are largely in use. To those who are not acquainted with the working of these drills, the results obtained from them will be interesting. An 'A. W.' twist drill of 1 inch diameter working on steel plates of 2 inches thickness at 250 revolutions per minute, and 5 inches feed per minute, generally drills 150 holes without re-grinding. The following is a comparison between a high-speed drill and an ordinary twist drill. Drilling on gun cradles of 5 inches thickness, an ordinary American twist drill did 8 holes only and failed, the end being completely burnt up, while an 'A. W.' drill did 124 holes at the same speed and feed without suffering any injury whatever. The drills were 2 inches in diameter, running at 80 revolutions per minute, and each hole was drilled in six minutes. The high-speed drills are equally efficient when used on cast iron, performing two to three times the work accomplished by ordinary twist drills, as, for instance: At the works of Messrs. Alfred Herbert, Ltd., Coventry, an 'A. W.' twist drill of 1 inch diameter drilled 30 holes through a 3-inch cast iron block, each hole being drilled at the rate of 7¼ inches feed per minute, the drill being uninjured; also a ¾-inch 'A. W.' drill is on the table, which has drilled cast iron at 25 inches per minute.

"The finishing qualities of high-speed steel have also been a matter of some contention, but there is abundant evidence that it will cut at high speeds and yet give a splendid finish at the same time. In support of this the author may refer to a visit recently paid to the works of the above company (Messrs. Herbert), and the finish obtained at high cutting speeds there seen was a revelation. The most excellent finish possible is obtained by them in their very ingeniously designed machinery and when taking one cut only; and their system, and the working of their machinery in conjunction with high-speed steel, is indeed a tribute to the development of thoroughly up-to-date engineering and rapid production of work bearing a high standard of accuracy.

"It cannot be denied that the question of high-speed cutting is one of national importance to our country, for if we are to remain successful and retain our position in the engineering world, we must not only possess the best and most modern designs of machine tools, but we must also produce the best qualities of tool steel to serve them to their utmost producing capacities; the one must be the reciprocal of the other as near as practically possible. Speaking for high-speed steel, we must feel that we are only in the early stages of its manufacture and use, and that nothing approaching finality has been arrived at. When the steel maker looks at the innumerable alloys of whose behavior and proportions when mixed with steel so much has yet to be learned, and also to the infinite number of combinations and percentages of those alloys with steel, and the corresponding varied results obtained, it is easily seen what a large field of research there is yet to traverse."

Chicago Pneumatic Tool Co.

The directors of the Chicago Pneumatic Tool Co., at a meeting held in Chicago last week, decided to suspend dividends. The company has a bonded debt of $2,500,000. Dividends of 2 percent quarterly were paid from April, 1902, to January, 1903, both inclusive; in June, 1903, 1¾ percent was paid, the deferred April dividend; July, 1¾ percent; October, 1¾ percent; 1904, January, ¾ percent, making 6 percent for the year.

When Charles M. Schwab was in Detroit a few days ago inspecting the Boyer plant of the Chicago Pneumatic Tool Co., he was asked whether there would be a concentration of the plants of the company at Detroit. He replied that there would be some concentration and that there would be a large extension to the Boyer plant. In an interview in Chicago Mr. Schwab stated that he is the owner of 40 percent of the stock of the Chicago Pneumatic Tool Co. and that he is very much pleased with his investment. He said he had been inspecting the plants of the company and had found them in splendid condition.

On Jan. 4, several of the creditors of the Saxton Furnace Co., of Saxton, Pa., filed an application in the United States District Court asking that the company be declared a bankrupt. The company has just filed a statement of its liabilities and assets. Its liabilities are placed at $312,035.38, while its assets are stated to be $634,326.72. Of the latter, $79,637.04 is made up of debts due, and $47,631.36 is made up of unpaid stock subscriptions. The first meeting of the creditors was held before referee Edwin F. Hoffman last week, but there was a failure to elect a trustee. Another meeting will be held for this purpose on April 28.

Mining will be resumed at the Antoine mine of the Republic Iron & Steel Co. at Iron Mountain, Mich. The force will be about 100 men, the same as last season's.

REAMER CLEARANCES.

BY FRED HOLZ.*

After constant experimenting for a period of more than one year, we have finally succeeded in establishing tables for four styles of reamers for obtaining the best possible clearances, the object being, to grind clearances on reamers which would ream the greatest number of smooth holes with a minimum amount of wear. The four styles of reamers are as follows: Hand reamers for steel; hand reamers for cast iron and bronze; chucking reamers for cast iron and bronze; chucking reamers for steel. We use adjustable blade reamers almost

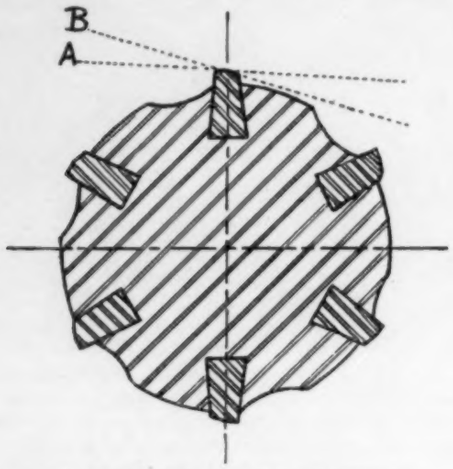


FIG. 1.—CROSS SECTION OF HAND REAMER.

exclusively, all of which are ground in the tool room. No one outside of the tool room is allowed to adjust the reamers in any way.

When we began these experiments, a report was kept of every reamer, as to what kind of clearance it had ground, and when it was returned to the tool room, it was accompanied by a report stating the number of holes it had reamed. The newly ground reamers were made to ream holes from ¼ of a thousandth to ½ of a thousandth above size, and were allowed to wear down to standard size when they had finished their performance. Various kinds of clearances were tried with varied results, until we reached a limit of reaming 1,070 holes with the same hand reamer before it showed any sign of needing regrinding or readjusting. These holes were ⅞-inch in diameter, 1-inch long, in parts made from shafting material known as "hub stock." These holes were from .001 to .002 inch under size before hand reaming, and were perfectly smooth when finished.

When reaming cast iron or bronze, only two or three hundred pieces could be reamed, since the wear of the reamer

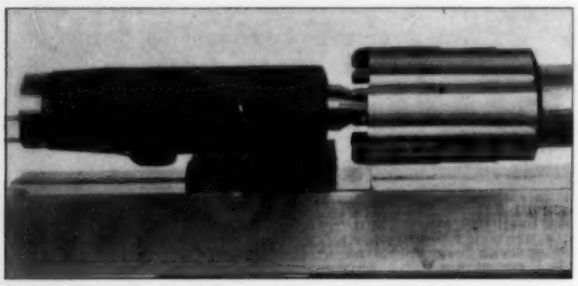


FIG. 2.—CHUCKING REAMER FOR REAMING STEEL.

on these materials is much greater than in steel, although could the error limits of the holes be greater, of course, a larger number could be reamed before the reamer would need readjustment. In our practice we aim to have all holes as near standard as possible, and the variation in the fits, such as for running and driving, is made in the shafts.

Fig. 1 shows a hand reamer. It will be noticed that there are two clearances ground on same, A and B. A small land of .025 inch wide is left on all hand reamers for cast iron and bronze, while a land of only .005 inch is left on hand reamers for steel. Chucking reamers for cast iron or bronze have 23 degrees beveled ends and are provided with two clearances along the blades. (See table 3.) The beveled ends have only one clearance equaling the second clearance given in table No. 3.

Fig. 2 represents a chucking reamer for reaming steel. In this case the knives are circular ground to exact size of hole to be reamed. The 45 degree bevel ends only have clearances. (See table No. 4.) On all reamers of this style, the knives are ground from .015 to .020 inch below size half of their length, towards the shank end. (See Fig. 2).

REAMER CLEARANCE.—Ground with cup wheel 3" diameter, tooth rest to be set central with emery wheel spindle. Set work holding centers above emery wheel center. Amount given below in Tables 1, 2 and 3.

Set tooth rest below work holding centers. Amount given below in Table No. 4.

*TABLE No. 1 Hand Reamer for Steel Cutting Clearance Land .006" wide			*TABLE No. 2 Hand Reamer for Cast Iron and Bronze Cutting Clearance Land .025" wide		*TABLE No. 3 Chucking Reamer for Cast Iron and Bronze Cutting Clearance Land .025" wide		†TABLE No. 4 Chucking Reamers for Steel Circular Ground
Size of Reamer	For Cutting Clearance	For Second Clearance	For Cutting Clearance	For Second Clearance	For Cutting Clearance	For Second Clearance	For Cutting Clearance on Angle Angle on End of Blade 45 Degrees
inch	inch	inch	inch	inch	inch	inch	inch
½	.012	.052	.032	.072	.040	.080	.080
9/16	.012	.057	.032	.072	.040	.080	.080
5/8	.012	.062	.032	.072	.040	.090	.090
11/16	.012	.067	.035	.095	.040	.100	.100
¾	.012	.072	.035	.095	.040	.100	.100
13/16	.012	.077	.037	.095	.045	.125	.125
⅞	.012	.082	.040	.120	.045	.125	.125
15/16	.012	.087	.040	.120	.045	.125	.125
1	.012	.092	.040	.120	.045	.125	.125
1 1/16	.012	.097	.040	.120	.045	.125	.125
1⅛	.012	.102	.040	.120	.045	.125	.125
1 3/16	.012	.106	.042	.122	.045	.125	.125
1¼	.012	.112	.045	.145	.050	.160	.160
1 5/16	.012	.118	.045	.145	.050	.160	.160
1⅜	.012	.122	.045	.145	.050	.160	.175
1 7/16	.012	.127	.045	.145	.055	.175	.175
1½	.012	.132	.048	.168	.055	.175	.175
1 9/16	.012	.137	.050	.170	.055	.175	.175
1⅝	.012	.142	.050	.170	.060	.200	.200
1 11/16	.012	.147	.050	.170	.060	.200	.200
1¾	.012	.152	.052	.192	.060	.200	.200
1 13/16	.012	.157	.052	.192	.060	.200	.200
1⅞	.012	.162	.056	.196	.060	.200	.200
1 15/16	.012	.167	.056	.196	.064	.200	.200
2	.012	.172	.056	.216	.064	.224	.225
4⅛	.012	.172	.100	.260	.110	.270	.270
4 1/16	.012	.172	.100	.260	.110	.270	.270
4¼	.012	.172	.104	.264	.114	.274	.275
4 5/16	.012	.172	.104	.264	.114	.274	.275
4⅜	.012	.172	.106	.266	.116	.276	.275
4 7/16	.012	.172	.106	.266	.116	.276	.275
5	.012	.172	.110	.270	.118	.278	.275
5⅛	.012	.172	.118	.278			

* Mount tooth rest on emery wheel head.
† Mount tooth rest on table of machine.

In grinding the clearances for the various kinds of reamers as given in tables No. 1, 2, and 3, the tooth rest is held stationary on the emery wheel head of the grinder (A in Fig. 3), while for the clearance for the 45 degree beveled ends on the chucking reamers for steel, the tooth rest is supported from the grinder table and travels with the work. (See B in Fig. 4.)

Fig. 5 represents a handy means for holding a small oil stone used in stoning the reamers. We oil-stone our chucking reamers and hand reamers for cast iron and bronze, but not the hand reamers for steel. A micrometer is used for measuring over the blades for size. We use India oil stone, medium grade, and use gasoline instead of oil.

The front end of all hand reamers is tapered about .005 inch in 1¼ inches. The back end of the blade is also slightly tapered, so as to avoid injuring the hole in backing out the reamer.

There seems to be a difference of opinion as to which direction an emery wheel should run, whether it should run to or from the cutting edge of the reamer. The danger of

*President of the Cincinnati Milling Machine Co., of Cincinnati.

carrying the heat to the edge is much greater when the wheel runs toward the edge, and thus the grinding must proceed more slowly and carefully. We grind all our cutters and reamers whenever possible with the emery wheel running in a direction away from the edge. It requires very little practice on the part of the operator to hold the work to the tooth rest, and the result is more satisfactory, since it leaves a

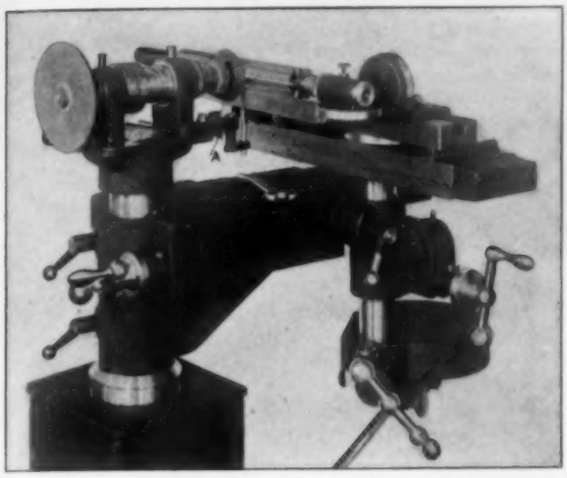


FIG. 3.—TOOL REST HELD ON EMERY WHEEL HEAD FOR GRINDING CLEARANCES ON TABLES 1, 2 AND 3.

cleaner cutting edge, while the danger of overheating is reduced. In order to carry out this work precisely, it was necessary to provide the grinder with a micrometer dial on the vertical adjustment, as shown at D in Fig. 3. The reamers as above described are ground on a Cincinnati Milling Machine Co.'s universal cutter and tool grinder.

The prompt action of the assistant superintendent and the night force of workmen at the United States Heater Co.'s plant in Detroit, Mich., checked what might have been a serious fire on the night of April 8th. As it was, the core building, 30 x 100 feet, was destroyed, together with a number of patterns and other valuable material. The loss is estimated at $5,000, fully covered by insurance.

During the last six months the railroads have ordered only 29,540 freight cars, whereas during the same period of 1902-3

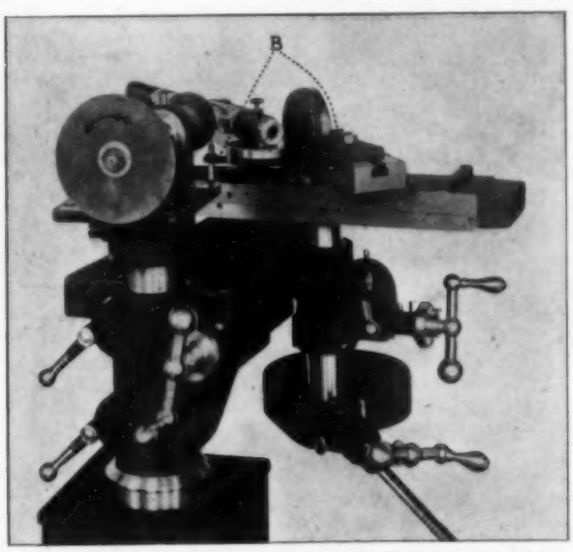


FIG. 4.—GRINDING CLEARANCE ON 45 DEGREE BEVELED END OF CHUCKING REAMER FOR STEEL.

the orders amounted to 133,420. During the last six months the orders for locomotives amounted to 634, as compared with 2,459 a year ago. More freight cars and locomotives were ordered in the single month of October, 1902, than in the entire last six months.

IRON ORES IN SOUTHERN UTAH.

Iron ore deposits of considerable promise have long been known in the Iron Mountain district of Iron and Washington counties, Utah, but because of their remoteness from railways and from the principal coking, manufacturing and consuming centers they received little general attention until the latter part of the last decade, when developments in the iron and steel industry made it necessary to look outside of the well-known iron producing districts for further supplies. Deposits that have been considered too remote or of too low grade to be valuable have recently been carefully investigated for future availability, and remote areas have been explored to discover new deposits. Among the remote deposits long known that are receiving much attention are those of southern Utah. C. K. Leith, of the United States Geological Survey, who visited these deposits in the fall of 1903, has discussed them briefly in the Survey's bulletin, No. 225, entitled "Contributions to Economic Geology, 1903."

The deposits are located along the slopes of a spur of the Wasatch mountains bordering the west side of the high plateaus of Utah, where the mountains break off to the Escalante desert on the west. The district is reached by the Salt Lake San Pedro and Los Angeles railway to Lund, and thence by stage about 22 miles across the Escalante desert to Iron Springs and Iron City, near which the ores are located.

The exposures of the iron ores lie in several isolated groups in an area tending nearly southwest-northeast. They extend for a distance of about 18 miles and range from a few feet to 2½ miles in width. The ores appear in conspicuous narrow ridges and crags, following roughly the contours of the hills and sometimes rising as much as 100 feet above the base of the outcrop.

FIG. 5.—OIL STONE AND HOLDER FOR STONING REAMERS.

The ore appearing in the jagged exposures is a hard, black, crystallized hematite and magnetite, the two minerals being present in varying proportions. Most of the ore that has been reached by test pipes and shafts is a somewhat soft, earthy, red hematite, containing much magnetite. Analyses show that a considerable proportion of these ores is of good grade, though for the most part non-Bessemer, but just what that proportion is remains to be determined by further underground work.

The economic importance of these deposits depends largely on the conditions and possibilities of manufacture and transportation. The nearest railway, the San Pedro, Los Angeles & Salt Lake, which runs south from Salt lake, passes about 22 miles west of the iron range. Persons interested in the ores are now discussing the feasibility of erecting blast furnaces and a steel plant at Utah lake or on Green river. Recent coking experiments are said to have shown the existence of coal suitable for coking within a reasonable distance of these points. If so, the principal difficulty that remains for those interested in the development of the deposits is to secure a market for their iron and steel products, and the matter of transportation is the most important factor in the solution of that problem.

It will be remembered that P. L. Kimberley and F. H. Buhl, of Sharon, Pa., had an option on properties in this Utah field, but did not exercise it. S. B. Milner & Sons, of Salt Lake City, are prominently interested now, with other Salt Lake City capitalists. The Colorado Fuel & Iron Co. has about 25 percent of the ore in these fields and the Milner interests about 70 percent. It is understood that in some cases only three feet of stripping is necessary. Utah lake, referring to above as the probable site of blast furnace and steel plants, is 54 miles south of Salt Lake City.

CLAMPING DEVICE FOR MICROMETER CALIPERS.

One of the principal features embodied in this device is simplicity, a very slight movement of the knurled ring being all that is required to clamp the measuring spindle firmly. As only a slight movement of any one of these parts is required, there is practically no wear upon them. Another feature that appeals to users of the micrometer is the adaptability of this device to maintain a given tension on the measuring spindle without danger of the tension being disturbed. For example, it is often desirable when measuring a number of pieces to adjust the tension on the spindle just sufficient to prevent its turning when the work is passing

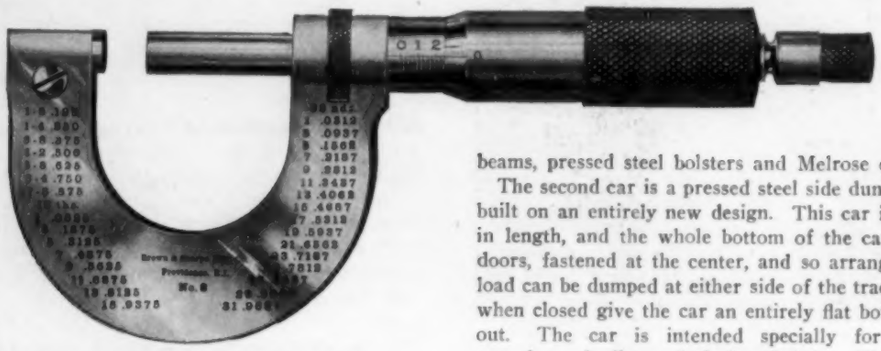


FIG. 1.—MICROMETER CALIPERS WITH CLAMPING RING.

between the measuring points; at the same time the spindle is left sufficiently free to allow slight adjustments.

When the clamp ring has been set to exert a certain tension, the rotation of the spindle cannot alter it, for the reason that the clamping ring is held stationary and forms a part of the bearing for the spindle. This device entirely does away with the danger of rotating or moving the spindle longitudinally when clamping, which, of course, would affect the accuracy of the original measurements.

The clamping ring is shown in position on the caliper in Fig. 1. The other illustrations show the details of the device.

The construction and operation of this device is as follows: The split ring 2, Fig. 2, fits the measuring spindle with a sliding fit when open, and insures a longer bearing for the spindle than is possible with the other devices used for this purpose. The ring is held from rotating by lug 4, which fits into a recess in the slot 9, Fig. 5. The roller 3, Fig. 2, which moves upon the inclined surface of the cut in the periphery of the ring, is actuated by the ring 1, Fig. 3. The clamping ring, with the roller at its lowest point, fits into the ring 1 with a sliding fit and as the ring 2 is held from rotating, the movement of the ring 1 to the right forces the roller up the inclined surface 5 and closes the ring concentrically around the measuring spindle. The slot in the caliper frame, Fig. 5, receives the two rings, together with the roller, and the spindle is passed through the ring 2. As the clamping ring closes concentrically and fits the slot with only sufficient play to allow its being turned, there is no opportunity for dirt or grit to get into the device and the spindle cannot be thrown out of alignment when clamping. The device cannot be taken out of the frame until the spindle has been run out sufficiently to clear the recess. This prevents it from being accidentally lost, as is many times the case with a nut and split bushing that fits over the end of the spindle.

Micrometer calipers with this improvement are manufactured by the Brown & Sharpe Mfg. Co., of Providence, R. I.

FIG. 2.

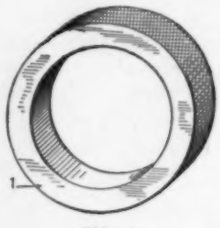


FIG. 3.

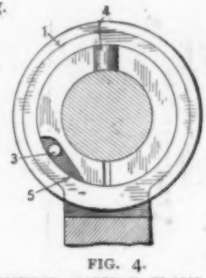


FIG. 4.

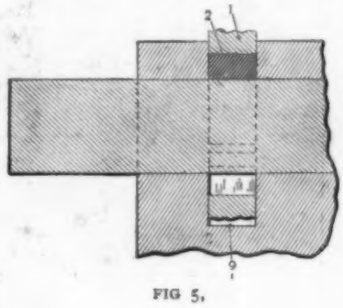


FIG 5.

DETAILS OF MICROMETER CALIPER CLAMP.

STEEL CARS AT ST. LOUIS.

The evolution in car building will be shown in the exhibit of the Pressed Steel Car Co., Pittsburg, at the St. Louis World's Fair. The exhibit will include one box and one flat car, two gondolas, a mine dump car and pressed steel car specialties. The first car in the train is what is known as the Pennsylvania Railroad Co.'s standard class "GSC" type of pressed steel gondola. It is 40 feet in length and has wooden drop ends for use in twin and triplet loads, drop doors, and weighs 39,400 pounds. This car is equipped with Pennsylvania railroad standard arch bar trucks, Westinghouse airbrake and Westinghouse friction draught rigging. National hollow brake beams, pressed steel bolsters and Melrose cast steel couplers.

The second car is a pressed steel side dump gondola car, but built on an entirely new design. This car is 41 feet, 6 inches in length, and the whole bottom of the car consists of drop doors, fastened at the center, and so arranged that the whole load can be dumped at either side of the track, while the doors when closed give the car an entirely flat bottom for shoveling out. The car is intended specially for carrying ballast, gravel, sand, dirt and similar freight. There are two kinds of doors on this one car to demonstrate both arrangements. The car is fitted with Westinghouse airbrake and the Lindstrom hand brake, the same as is used on Pullman passenger coaches. This latter is the invention of Chief Engineer Lindstrom, of the Pressed Steel Car Co., The car weighs 41,500 pounds.

The third car is a box car, but entirely new in design, with structural steel underframing and steel superstructure. The total weight is 40,000 pounds, which is from 2,000 to 3,000 pounds lighter than a similar wooden car with steel underframing. The same ideas that obtain in the construction of a steel-framed building apply to this car, part of the weight of the load being borne by the sides of the structure. This helps to make the car lighter by reason of lighter material being used in the underframing. The car is equipped with steel trucks, airbrake and No. 2 security slide doors.

The fourth car is an improved steel flat car with wooden floor, 33,100 pounds weight—much lighter than the average car with a similar capacity.

A plan for the reorganization of the Fore River Ship & Engine Co., Weymouth, Mass., has been agreed upon by a bondholders' committee appointed for the purpose. It is proposed to issue $4,800,000 in stock, equally divided between common and preferred shares, and to raise $1,250,000 of new money by assessing the bondholders 40 percent, and the old preferred stock 33⅓ percent. Of the new money $300,000 will be used to complete the plant, $600,000 to pay off the company's floating debt and $350,000 as a working capital.

The Association of German Machinery Works at the recent general meeting discussed the advisability of publishing a technical journal, printed in English, for circulation in English speaking countries.

PITTSBURG ENGINEERS ON THE BALTIMORE FIRE.

At the regular monthly meeting of the Engineers' Society of Western Pennsylvania, held in Pittsburg on Tuesday, April 19, W. N. Hazen, of Baltimore, reviewed the effects of the Baltimore fire, illustrating his address with stereopticon views. He merely reviewed the effects of the conflagration and barely touched upon the lessons that engineers and architects might learn for fire proofing structures of the future, from the glaring errors manifest in the construction of many of these alleged fire proof buildings. The discussion of the paper was extremely interesting, a number of engineers in attendance having examined the burned and partly burned buildings for the purpose of determining what construction stood the test and what construction should be avoided in the future.

Armin Schotte examined the ruins shortly after the fire and stated that the conflagration brought up many questions for engineers and architects to solve. How far fire-withstanding construction should be carried out in the erection of modern buildings was one of the questions which presented itself to him, and whether a building should be constructed to withstand so fierce a fire as that at Baltimore or only the ordinary conflagration. He said that he believes that buildings should not only be designed proof against fire but should also be able to withstand shocks caused by the destruction of buildings not so designed. In addition he favored the enactment of building laws which will prevent the erection of combustible buildings in the congested portions of any city. As to the steel work of buildings, he said that it should be protected properly so that its protection will not be destroyed by fire, as no protection at all is as good as bad protection and much cheaper.

Emil Swensson, one of the foremost structural engineers in the country, also examined the Baltimore ruins and concluded that the steel work, while showing little damage from the fire, will prove to be more affected than the first examination shows. He believed that while bent steel work can be straightened it will prove more economical to replace it entirely with new material. However, he added that little of the steel will prove to have lost any of its strength; in fact the fire will have the tendency to improve the quality of the material if it had not reached the stage where it would buckle, and little of the steel in the buildings that went through the Baltimore fire reached this stage, as is evidenced by the fact that many or nearly all of the steel structures are still standing despite the intense heat through which they passed. An examination of the steel that passed through the Horne building fire in Pittsburg in 1897 showed that the fire had in reality improved the steel, test pieces showing increased elasticity, etc. However, he deplored the great economy that is being exercised in the erection of the modern sky scraper. Were it not for this tendency towards greater economy and cheaper material he said that many of the Baltimore buildings would have better withstood the fire. The fire proofing tile was not of sufficient thickness to withstand the heat. Were these tiles made of a proper thickness and of better materials he believes that they would have stood up much better than they did. In addition, he said, that brick made from hard burned fire clay showed better resistance against fire than ordinary shale brick and this was proved in examining the ruins of an old building where these better made brick were used and a more modern structure in which brick made at the present time from inferior materials were used entirely. The question of properly fire proofing a building all resolves itself, said Mr. Swensson, into the expenditure of dollars and cents. If sufficient concrete and sufficient clay in the terra cotta is used, there is no doubt about the successful fire proofing of any building. He called attention to the O'Neill building in Baltimore which was in the path of the flames and which was untouched. He said that the owner of the building was unable to secure insurance owing to the age of the structure and in order to protect it properly against fire automatic sprinklers were installed, both inside and outside the building. The result was that one sheet of water on the outside protected the building from fire and it was untouched. So great was the heat during the fire that many of the larger fire proofed buildings were gutted in from 15 to 20 minutes and at many points the heat was so great that water never touched the buildings from the many fire hose playing on the fire.

Samuel Diescher suggested that some material beside granite, stone, terra cotta and brick, which spawled badly and which will have to be replaced entirely, must inevitably be found to withstand such a heat. He suggested cement blocks, which if spawled can be patched up without the necessity of replacing the entire block, as it necessary where stone, brick, granite or terra cotta is cracked or spawled.

Mr. Aiken had seen the ruins of the Boston and Chicago fires, both being blackened ruins, but the ruins of the Baltimore fire are white, indicating the intensity of the heat at the recent fire as compared with the two other great conflagrations.

The question of fire shutters was brought up and it was shown that the shutters required by the underwriters being of wood and sheathed inside and out with tin did not withstand the heat at all, the wood having burned out entirely, leaving the tin badly warped and bent. On the other hand, where steel shutters were used, made of quarter-inch material, the fire protection was excellent, while the shutters were replaced after being straightened out.

Some of the engineers believed that concrete encasement of steel pillars formed a better protection against fire than the ordinary tile fire proofing material, possessing greater elasticity and not being so liable to crack and crumble from the heat. Some of the speakers objected to concrete owing to its weight, but it was stated that where used throughout the construction of a building the dead load would be fully 25 percent less than where terra cotta was used. Mr. Hazen, in his paper, stated that wire glass withstood the fire very well, not crumbling, merely cracking and holding together firmly. With regard to shutters, he said that they should be of such construction as will withstand the heat without giving way. As to the use of steel in the construction of modern high buildings, it was shown that there was no question at all as to its utility, strength and rigidity, even when exposed to so great a heat as that of the Baltimore fire, and that the cost of replacement will be greatest of the so-called fire proofing materials.

Pennsylvania Steel Products in Canada.

Graham Fraser, general manager of the Dominion Iron & Steel Co., Sydney, Cape Breton, is quoted as follows in a recent interview published at Montreal:

"The steel industry of Canada is just now seriously suffering on account of the depression in the United States. There is no relief in sight. Canada is being made the slaughter market of the steel operators in the United States. They are unloading their products upon us at prices far below those prevailing at Pittsburg. The prices are so low that we cannot possibly compete. I know of a contract recently made with an American firm for 450 tons of structural steel several dollars less per ton laid down in Canada than the market price at Pittsburg. Steel billets can be purchased by Canadians in the United States at lower prices, including delivery, than those paid by American firms."

There has been considerable comment in Canadian papers on the fact that wire mills in Canada were compelled recently to give the United States Steel Corporation their orders for six months' supply of wire rods, in view of the expectation that the rod mills of the Dominion Iron & Steel Co. will start up in June. The manufacturers wanted to make short time contracts and in May, when navigation opens in the St. Lawrence, import from Europe, while in the following month they would be able to buy from the Dominion company. It is understood that the Steel Corporation refused to entertain orders for less than six months and the Canadian manufacturers, with the exception of the Pender nail works at St. John, N. B., acceded to the terms rather than shut down.

The United States Steel Corporation's export department has secured an order for about 5,000 tons of rails from the New Zealand Electric Construction Co. The order calls for 4,330 tons of girder rails, 355 tons of 73-pound T rails and 477 tons of 95-pound sections. The Lorain Steel Co. has been given the order for switches and crossings and the American Steel & Wire Co., will furnish the wire and cables.

One of the main attractions of the Pittsburg exhibit at the World's Fair at St. Louis will consist of a steel trophy made from steel rails arranged like the pipes of an organ, the center rail to be 60 feet in height and the heaviest section, while smaller sections will constitute the remainder of the exhibit. The idea of building a model miniature blast furnace has been abandoned owing to the expense involved.

REVISED SCRAP CLASSIFICATION.

The Republic Iron & Steel Co. has adhered to the following revised classification since Feb. 1, 1904, in buying its old material:

Iron Axles.—Iron railroad car axles; M. C. B. sizes, free from locomotive axles or defective or imperfect forgings.

Steel Axles.—Steel railroad car axles; M. C. B. sizes, free from locomotive axles or defective or imperfect forgings.

Iron Rails.—Standard section T rails, original weight 50 lb. per yard or heavier, minimum length 4 ft., free from frogs, guards, switches, turntable and curved rails.

Steel Rails.—Standard section T rails, original weight 50 lb. per yard or heavier, minimum length 3 ft., free from split heads, frogs, guards, switches, curved and turntable rails.

No. 1 Railroad Wrought.—Heavy wrought iron from railroad shops and cars, 6 inches and longer, including links and pins.

No. 2 Railroad Wrought and Track Scrap.—Heavy wrought iron and soft steel scrap from railroad shops and cars, 2 inches and longer, including track bolts, spikes, nuts, channel bars and mixed standard angle bars and splices.

Shafting.—Iron and soft steel, 1½ inches to 4 inches round and square; 4 feet and longer, in straight bars.

No. 1 Wrought.—Heavy wrought iron and soft steel fagoting scrap. Bars ⅝ inch to 4 inches, round or square; flats ¼ inch thick and heavier, 4 inches long or longer, including wagon axles, horse shoes and wagon tires, exclusive of other shapes or bent pieces.

No. 1 Country Wrought.—Heavy wrought iron and soft steel scrap, including buggy tires, horse shoes; not less than 75 percent to be fagoting scrap, free from cast, malleable, hard steel and sheet iron.

No. 1 Mill.—Iron and soft steel bars, not less than ⅜ inch round or square and flats not thinner than No. 12 wire gauge, including heavy railroad sheet, tank in separate sheets and rings, boiler sheets and rings, clean pipes and flues, heavy punchings and clippings and strictly soft steel argricultural implement shapes.

No. 2 Mill.—Iron and soft steel hoops and sheets, railroad sheet, cotton tie clippings and ties, and iron too light for No. 1 mill; wire rope 10 ft. lengths and under; wire netting, free from galvanized or tinned stock, tangled wire and skeleton sheet scrap.

No. 1 Busheling.—Iron and soft steel pipes and flues (clean); tank and bands No. 12 and heavier, boiler plate punchings and clippings, and soft steel and iron drop forgings and trimmings; nothing to be over 8 inches long or wide, free from galvanized or tinned stock.

No. 2 Busheling.—Cut hoops, sheet, cotton ties and similar light material; nothing to be over 8 inches long or wide; bundled wire and bundled sheet suitable for busheling without further preparation; bundles not to weigh over 40 lb. and not to be over 15 inches in height, width or length; all free from hard steel, cast and malleable, and galvanized or tinned stock.

Axle Turnings.—Wrought iron and soft steel railroad car axle turnings and chips.

Turnings.—Machine wrought and soft steel, clean and free from borings and drillings, other metals, dirt and lumps.

Drillings.—Wrought or soft steel, clean and free from other metals, dirt and lumps.

Mixed Borings and Turnings, and Cast Borings.—Clean and free from other metals, dirt and lumps.

No. 1 Boilers, Cut.—Boiler sheets and rings not under 30 in. diameter, all rivets cut.

No. 2 Boilers, Cut.—Boiler sheets and rings, under 30 inches in diameter, and riveted flues, not under 16 inches in diameter, all rivets, cut.

Boiler Shop Scrap and Ship Building Shop Scrap.—Wrought and soft steel bar, shape and plate ends, punchings and shearings, free from curly clippings and hard steel.

No. 1 Cast.—Machinery and railroad cast, no piece to weigh over 75 lb.

Stove Plate.—Stove plate and railroad locomotive grate bars, free from burnt iron.

Bundled Sheet Scrap.—New sheet clippings and shearings, securely bundled; bundles not over 15 inches in height, width or length (may be round or square), and weighing not over 40 lb. each, of uniform solidity, not pressed by machinery.

Pipes and Flues.—Wrought and soft steel. Must be free from dirt or lime and from riveted seams and malleable or cast iron fittings.

BRITISH WESTINGHOUSE STEEL FOUNDRY.

A recent paper before the Cleveland (Eng.) Institute of Engineers by C. H. MacMillan, manager of the steel foundry of the British Westinghouse Co. at Trafford Park, near Manchester, Eng., refers to the expense at that plant with the Wellman rolling furnace. He enumerates the advantages as follows: "The hottest part of the heat is received into the bottom of the ladle, consequently there is less loss from sculling. There is never any loss from draining at the tap hole. No hot work or delay on the tap hole. Instantaneous tapping. The furnaces can be charged as soon as it is rolled back in position, thereby making use of practically all of the initial heat. If there is a hole in the bottom of the hearth it can be drained and repaired in a satisfactory manner. If a hole occur in the front breast one can plug the tap hole, roll the furnace and repair. The back wall being built so that the lining extends to the roof, is permanent. Having removable port ends, the worn out parts are replaced with a spare set. If for any cause the operator desires to make two tappings from the same heat he can do so. In a word, it is an open-hearth furnace; machine-like in its operation, and under the absolute control of the operator."

The Westinghouse steel foundry at Trafford Park has two 20-ton Wellman tilting furnaces to which gas is supplied by five Duff producers. Pig iron or scrap is hauled by a 50-h. p. electric motor up an incline approach from the outside track to the charging platform. The Wellman charging machine is of the overhead or crane type. The furnaces are tilted through suitable gearing by 75-h. p. Westinghouse motors.

Figures are not available for the Westinghouse foundry showing the economy from the use of the charging machine. Data are quoted, however, from experience with a similar machine at the plant of Vickers, Son & Maxim. These show a reduction in wages per ton from 2s 8d to 1s 6d, and a reduction in the time of charging from 4 hours to ½ hour. In addition the charges per furnace increased from 9 to 12 per week.

The following concerning the practice at the Westinghouse steel foundry is given by the London *Iron and Coal Trades Review:*

"The Westinghouse foundry is making steel castings, charging one heat per day, consequently the furnace is cold a great part of the time. Against these unfavorable conditions they have charges consisting of 50 percent scrap, 10 percent cast iron turnings, and 40 percent low phosphorus and low silicon pig. The time of each heat has varied from 5 hours and 25 minutes to 6 hours and 30 minutes. Mr. MacMillan, the foundry manager, has stated that he tried to obtain pig iron carrying 1 percent phosphorus and 1 percent silicon, with not over .05 sulphur, but was unable to get it. Pig iron was offered having 1½ percent silicon and 2½ percent phosphorus, or pig carrying 1 percent silicon and low phosphorus. Inasmuch as steel castings were to be made with not more than .02 phosphorus and .03 sulphur, and as the works produce many tons of cast iron turnings, which the steel foundry is called on to use, the low phosphorus and low silicon pig iron was chosen."

The Winnebago Machine & Foundry Co. and the Polar Star Electric Co., of Faribault, Minn., have incorporated under the name of the Faribault Mfg. Co., authorized capital $50,000, with $25,000 paid up. The Faribault Mfg. Co. bought an old stone mill property 36 x 82 feet, three stories, is rebuilding it and will build a foundry. The property is situated in the midst of the tracks of the Chicago & Great Western, the Chicago & Rock Island and the Chicago, Milwaukee & St. Paul railroads, none of them being over 500 feet from the building. The company contemplates building gas and electric engines and motors, air compressors and other things incident to that line. The new company states it will have plenty of capital to push the enterprise to any extent the demand will warrant. The Winnebago Gas Engine & Construction Co., Winnebago, Minn., will be a part of the new concern and is now moving to Faribault.

The Republic Iron & Steel Co. has notified the roll turners in its employ at Youngstown, O., that it will terminate its present agreement on June 1.

CINCINNATI METAL TRADES ASSOCIATION.

The Cincinnati Metal Trades Association gave its quarterly dinner at the Business Men's Club on the evening of April 14. There was the usual attendance of representative machinery and machine tool manufacturers. Wm. Lodge, of the Lodge & Shipley Machine Tool Co., presided as toast master in his usual graceful manner.

Walter Laidlaw, of the Laidlaw-Dunn-Gordon Co., was the first speaker introduced. He gave an interesting account of the founding, history and progress of the Ohio Mechanics' Institute of Cincinnati. This institution is already doing important service for manufacturers in iron working lines in Cincinnati, and labor drawn from the pupils of the school has proved the value of the manual training which the institute affords. For this reason, the machine tool manufacturers and machinery builders in all lines are interested in the welfare of the institution. It was pointed out by Mr. Laidlaw that the demand for manual training and the applications of students had already crowded the facilities of the institute beyond capacity. He appealed for financial support for the institution and stated that Mr. Andrew Carnegie had already virtually promised assistance as soon as local interests promised substantial support.

Foundry facilities for students were advocated and the inefficiency of the average molder of today was commented upon. Mr. Laidlaw stated that he believed there was more room for improvement in foundry practice than in almost any other branch of the iron working industry. He advocated more careful chemical analysis of irons and cokes used, saying that molders were constantly losing castings without knowing why. In this connection he pointed out the benefits which had come from the employment of a chemist at his plant for the purpose of analyzing the irons and coke used, and also for testing of castings for hardness and softness, adding that under proper conditions, softness and closeness of iron could be obtained.

This statement of his experiences suggested the value to Cincinnati manufacturers of a foundry plant that might be established at the Ohio Mechanics' Institute in connection with a chemical laboratory, so that for a small fee, iron, coke and castings might be tested and molders be instructed so that better results might be obtained. The suggested training for molders would enable Cincinnati manufacturers to obtain the best intelligence from the pupils of institute for employment in their foundry work.

Prof. J. L. Shearer, of the Ohio Mechanics' Institute, followed Mr. Laidlaw with an interesting address on the value of manual training, which was well received.

J. C. Hobart, of the Triumph Electric Co., spoke on the bill now before the Ohio Legislature, amending the conditional sales law of Ohio. The present law provides that the seller of any article retains ownership of such article until paid for, and has the right to reclaim the article for the unpaid account, provided he refunds 50 percent of the amount which has been paid. Another amendment to the law provides that the seller can retain the entire amount paid provided it does not exceed 25 percent of the contract price of the article. The original law exempts dealers in railway supplies so far as the refunding of anything is concerned. The Ice Machine Builders' Association petitioned the Ohio Legislature to exempt certain lines of machinery, and bills have been introduced covering this point. The bills now pending are known as House Bills 534 and 535, and are designed to place manufacturers of machinery, engines, boilers, etc., on the same basis as manufacturers of railway supplies. Mr. Hobart offered the following resolution, which was unanimously adopted:

"It is the sense of this meeting that the present law relating to conditional sale contracts whereby the title does not pass to the purchaser until full payment has been made, should be amended to place manufacturers of machinery, engines, boilers, etc., on the same basis as manufacturers of railway supplies."

The secretary was instructed to forward a copy of this resolution to Hamilton county senators and representatives with the request that they use their influence and vote for House Bills 534 and 535.

H. M. Norris, of the Bickford Drill & Tool Co., and C. Wood Walter, of the Cincinnati Milling Machine Co., contributed to the amusement of the guests with some offerings in a lighter vein.

Mr. Lodge presented an interesting paper on high speed steel which was the paper he prepared for the National Metal Trades Association's Philadelphia convention.

Robert Wuest, secretary of the National Metal Trades Association, made a brief address on the value of labor bureaus established through the efforts of the N. M. T. A. Those present were the following:

Wm. Lodge, S. B. Weber, Lodge & Shipley Machine Tool Co.
J. L. Shearer, Ohio Mechanics' Institute.
H. C. Hoefinghoff, H. M. Norris, L. G. Keck, Bickford Drill & Tool Co.
Walter Laidlaw, Laidlaw-Dunn-Gordon Co.
Lowell F. Hobart, Guest.
J. C. Hobart, Triumph Electric Co.
Robt. Wuest, secretary, N. M. T. A.
F. W. Combs, Assistant secretary Cincinnati Metal Trades Association.
P. S. Laws, United States Cast Iron Pipe & Steel Co.
Wm. Greaves, Greaves, Klusman & Co.
D. P. Hopkins, United States Cast Iron Pipe & Foundry Co.
C. Wood Walter, E. M. Chace, Cincinnati Milling Machine Co.
C. E. Greenwald, T. J. Greenwald, I. & E. Greenwald Co.
O. E. Robinson, American Tool Works Co.
Geo. C. Montague, Norton Grinding Co.
F. N. Temple, E. V. Atkins, Warner Elevator Co.
B. B. Quillen, Geo. Langen, Cincinnati Planer Co.
S. C. Schauer, Cincinnati Machine Tool Co.
N. B. Chace, P. G. March, Cincinnati Shaper Co.
S. H. Stone, Prentiss Tool & Supply Co., Buffalo.
J. H. Day, J. H. Day Co.
Benj. Sebastian, Jacob May, Sebastian Lathe Co.

Annual Meeting, Iron and Steel Institute.

The annual meeting of the Iron and Steel Institute, Andrew Carnegie president, will be held at the Institution of Civil Engineers, London, May 5 and 6. The first day's program includes the presentation of the Bessemer gold medal for 1904 to R. A. Hadfield, of Sheffield, vice president, also the awards of the Andrew Carnegie gold medal and research scholarships for 1904. There will be at the first day's session a demonstration of pyrometers suitable for metallurgical use, and a report of a committee on pyrometers. The papers include the following:

"Coke Ovens," by C. Lowthian Bell, Middlesbrough.

"Troostite," by H. C. Boynton (Harvard University).

"The Range of Solidification and the Critical Ranges of Iron-Carbon Alloys," by H. C. H. Carpenter and B. F. E. Keeling.

"Explosions Produced by Ferro-silicon," by A. Dupré and Capt. M. B. Lloyd.

"Thermal Efficiency of the Blast Furnace," by W. J. Foster, Darlaston.

"Production and Thermal Treatment of Steel in Large Masses," by Cosmo Johns, Sheffield.

"Manufacture of Pig Iron from Briquettes at Herräng, Sweden," by Prof. H. Louis, Newcastle-on-Tyne.

Reports on research work carried out during the past year will be submitted by C. O. Bannister, London; P. Bruil, Paris; K. A. Gunnar Dillner and A. F. Enström, Stockholm; J. C. Gardner, Middlesbrough; F. H. Wigham, Wakefield; A. Campion, Cooper's Hill, and by P. Longmuir, Sheffield—Andrew Carnegie research scholars.

The Farmers' Co-operative Farm Machinery & Implement Mfg. Co. of North America, recently organized at Springfield, O., by William N. Whiteley, has selected the following directors: William N. Whiteley, S. H. Ellis, formerly master of the Ohio Grange; R. L. Holman, business manager of the Ohio Grange; O. E. Bradfurte, D. P. Jeffreys, James Johnson, John J. Hoppes, David Elder and W. J. Ferguson. Mr. Hoppes is a manufacturer of Springfield and is to be president of the company.

The American Locomotive Co. and Col. Wm. Barbour, the largest stockholder of the Rogers Locomotive Works, state that the report published in newspapers that the control of the latter company has been obtained by the former is not true.

THE IRON TRADE REVIEW

Devoted to the Machinery, Metal-Working and Foundry Trades and Iron and Steel Manufacture.

PUBLISHED EVERY THURSDAY BY

THE IRON & STEEL PRESS CO.

ROSE BUILDING, CLEVELAND, OHIO.

G. H. GARDNER, President and Treasurer.
JOHN A. PENTON, Vice-President.
A. I. FINDLEY, Secretary.

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CHICAGO: 1115 Monadnock Block, GEO. H. GRIFFITHS, Manager.
PITTSBURG: 429 Park Building, A. O. BACKERT, Manager.
NEW YORK: 150 Nassau St., D. C. WARREN, Manager.
THE CENTRAL WEST: R. A. EVANS, Manager.

Subscription, $3.00 per annum. To Foreign Countries, $4.00.
Advertising Rates Furnished on Application.

The Cleveland News Co. will supply the trade with THE IRON TRADE REVIEW through the regular channels of the American News Co.

ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER.

APRIL 21, 1904

RAILROAD BORROWINGS.

Attention is again forcibly called to the demands of the railroads upon the money market, by the renewed borrowings of important companies within the last week. The magnitude of these transactions is impressive, and the disposal of the funds thus acquired, interesting. The steel industry, especially the rail and structural mills, can testify that the railroads have not been generous with orders since the opening of the calendar year, but the outlook for the second or third quarter of 1904 is a little brighter now that the railroads have seemingly satisfied pressing financial needs. While the railroads are not buying rails and bridge material freely they are contributing not a little, even though indirectly, to the improvement in the iron industry. The purchase of locomotives and cars continues in a desultory manner, but in the aggregate there is some improvement, and this has been a little more marked in the past fortnight. It is through the contracts placed for shop equipment, however, that the influence of the railroads is being felt most. The new tool steels and the more general introduction of electricity as a mechanical drive into machine shop practice is making imperative the purchase of new types of machine tools to attain the greatest efficiency and economy.

To provide for expenditures beyond fixed charges, justified by prospectively increased earning power, the railroads under ordinary conditions have recourse to the security market. At present this field is too narrow and too sensitive, because of its congested currents, to absorb even high class bonds or stocks, advantageously to the borrower; hence, for temporary accommodations the railroads and other corporations are obliged to lean upon the money market, which they are doing with great confidence in the support and their own future ability to liquidate the indebtedness. Among the most important companies that have tested their credit within the last ten days are the Baltimore & Ohio, Rock Island, Chesapeake & Ohio, and Norfolk & Western. These four roads have bonded in all $21,000,000 on short time notes, bringing the aggregate railroad note issues since Jan. 1 to $90,000,000. In the same time about $52,000,000 railroad bonds have been sold and $20,000,000 new stock floated—a total of $162,000,000 in three months, or at the rate of $54,000,000 per month for railroads alone. During the same time other corporations have either borrowed on notes or new security issues about $80,000,000, making a grand total of $242,000,000. About $40,000,000 of the proceeds has been utilized to take up maturing obligations, fixed charges or floating indebtedness, making the net draft upon the money and security markets in round numbers, $202,000,000; but the brunt of the borrowing has been borne by the loan market. Small doubt is entertained that eventually these note issues will be converted into stock or bonded obligations. Indeed it is authoritatively stated that the $50,000,000 loan secured by the Pennsylvania railroad will be liquidated in time by an issue of stock.

When it is recalled that corporations, mainly railroads, borrowed upward of $133,000,000 during the last quarter of 1903, and that these loans were preceded by liberal stock issues and bond flotations earlier in that year the figures assume imposing proportions. The monetary needs of the railroads appear to be pressing and under such circumstances little heed is given to the fact that the security market is congested by inflated industrial issues, and that the investment digestion is not strong enough to accommodate even railroad issues. As long as railroads have credit, however, they may borrow from financial institutions, at home and abroad; but in proportion as these borrowings cut down the loanable funds available, speculation—which is as spice to the investment appetite—is reduced. The result may be to compel a renewal of the temporary loans at higher rates rather than a conversion into bonded indebtedness. But this is a problem which only the future can solve.

At present the iron industry is more concerned in the distribution of the funds by the railroads. The assurance is given that terminal facilities are to be greatly increased at New York, Pittsburg and Chicago, and other improvements instituted at various points along the lines of the borrowing roads. When it is recalled that the postponement of railroad needs in iron and steel has always meant just so much accumulation of demand which eventually had to be satisfied, with the result that prices soared and the mills were congested with work, the recent lull in railroad buying is to be construed as simply the storing up of business which the iron trade will get on a basis of good profits in due time.

SURPLUS BLAST FURNACE CAPACITY.

It has been the unvaried experience in the American iron trade that a period of prosperity brings an aftermath of unneeded productive capacity. It is wholly unnecessary to call attention to the mere existence of this condition at the present time in our blast furnace industry, but a study of the nature and extent of the additional capacity is both interesting and startling. We say "nature" because the principle works out differently at different times. Fifteen or twenty years ago a prosperous period encouraged the building of furnaces scattered all over the South; when the day of reckoning came these furnaces disappeared. With the

recent new erection it will be different: it will be the old and not the new furnaces which will disappear.

For an intelligent study it is necessary to fix the date when domestic consumption during the recent boom reached its height. No trouble is experienced in placing it in the second quarter of 1903. The monthly consumption during the quarter, adding imports of pig iron and crude steel to pig iron production, and making allowance for furnace stocks, was:

	Gross tons.
April, 1903	1,783,000
May, 1903	1,799,000
June, 1903	1,774,000

Evidently May was the high point. In that month the then capacity produced pig iron at the rate of 20,675,000 tons annually, the indicated consumption being at 21,180,000 tons. Then the study must be of positive additions to capacity since May 31, 1903. Rebuilding need not be considered. There have been blown in by interests outside the Steel Corporation furnaces at points named and with daily capacity as follows:

	Tons daily.
Toledo, O., June 1, 1903	350
Clairton, Pa. (No. 2), June 21, 1903	425
Tuscaloosa, Ala., Aug. 6, 1903	175
Dubois, Pa., Aug. 10, 1903	300
Cleveland, O., Aug. 21, 1903	300
South Chicago, Ill. (Deering, No. 2)	350
Gadsden, Ala., Jan. 1, 1904	400
Detroit, Mich., Feb. 15, 1904	300
Pittsburg, Pa. (Eliza No. 5), April 5, 1904	450
Clairton, Pa. (No. 3), April 13, 1904	425
Total	3,475

In the same time the United States Steel Corporation has blown a No. 5 at Carrie, adding 450 tons, making a grand total of 3,925 tons. One Donora is ready to blow, but has not started.

It would be idle to compile a list of all the furnaces which have been projected, or even on which work has actually been started, in the past two or three years, but which are not completed, but by culling out nearly all projects about the completion of which there is any doubt, a list can be compiled the total of which is a safe one. Such a list follows:

Steel Corporation.

	Tons daily.
Donora, No. 2	500
McKeesport, Nos. 3 and 4	1,000
Youngstown, O., No. 4	500
Lorain, Nos. 3 and 4	1,000
Sharon, Nos. 2 and 3	600
Total	3,600

Outside.

	Tons daily.
Buffalo, N. Y. (Lackawanna Nos. 3 to 6)	3,200
Buffalo, N. Y. (Buff. & Susq., Nos. 1 and 2)	800
Johnstown, Pa. (Cambria, No. 7)	400
Port Oram, N. J. (Wharton, No. 3)	300
Steubenville, O. (La Belle, No. 2)	400
Ensley, Ala. (T. C. I., No. 6)	300
Pueblo, Col. (Minnequa, F)	450
Total	5,850

There might be added some others, including another stack at Pueblo, Col., at Gadsden and Woodward, Ala., etc. With the exception of Lackawanna Nos. 5 and 6 and possibly one or two others, there is no reason why the furnaces listed above could not, if desired, be completed and put in operation by the end of the present year. Allowing a full year for these furnaces to be added to the operative list we have approximately the following:

Blown in during 10½ months following point of greatest demand:

	Tons.
Steel Corporation	450
Others	3,475
Total	3,925

Capable of completion during following 12 months:

	Tons.
Steel Corporation	3,600
Others	5,850
Total	9,450

The grand total of laggard capacity is 13,375 tons daily, of which the Steel Corporation furnishes 4,050 tons. An allowance for all reasonable contingencies is made by multiplying the daily capacity by 300 to reach the annual, which gives a grand total of 4,012,500 tons. This is an approximation to the increase in actual production during the five years of high prosperity beginning with 1899. Consumptive demand cannot take care of a further similar increase crowded into a couple of years. Obviously there must be a survival of the fittest. The beginning of the elimination process has been made with some Eastern Pennsylvania and scattered Southern furnaces, and some Southern Ohio furnaces will likely have to make way. An awkward feature is that the furnaces that must go are generally small ones and it takes two or three to make way for one new one.

Personal.

William J. Bassett has resigned as secretary of the Eastern Steel Co., of Pottsville, Pa., and has taken charge of the office of E. Dreifus & Co., scrap dealers, in the Arcade building, Philadelphia.

Carl Horix, for several years general manager of the Geo. B. Sennett Co., Youngstown, O., has accepted the position of sales manager with Curtis & Co. Mfg. Co., of St. Louis.

P. E. Montanus, secretary of the Springfield Machine Tool Co., Springfield, O., has been nominated for Congress by the Democrats in the seventh district. His opponent is Gen. J. Warren Keifer, ex-Speaker of the House. The district ordinarily is 4,000 Republican.

J. W. Tierney, ex-president of the Philadelphia Pneumatic Tool Co., has sailed for Europe to represent the company's interests there. He expects to be abroad about eight months and will make his headquarters in London.

Andrew Carnegie has made a contribution of $5,000,000 for the endowment of a fund for heroes and their dependents. The hero fund commission is composed of the following Pittsburg gentlemen, the offices of the commission to be located in Pittsburg: Charles L. Taylor, president; F. M. Wilmot, secretary; W. L. Abbott, E. H. Anderson, W. W. Blackburn, E. M. Bigelow, Robert Pitcairn, Hon. H. K. Porter, James H. Reed, Hon. Joseph Buffington, William N. Frew, Rev. W. J. Holland, D. D., John B. Jackson, Thomas Lynch, C. C. Mellor, W. L. Scaife, William Scott, W. H. Stevenson, T. N. Miller, Thomas Morrison and F. C. Perkins.

B. C. Taylor has been appointed Wheeling, W. Va., representative of the Mount Union Silica Brick Co., and the Savage Fire Brick Co. The sales offices of these two companies are in the Park building, Pittsburg.

Harry J. Koch, formerly assistant secretary of the Buffalo Chamber of Commerce has accepted the business management of the plant of the American Steel Foundries at Sharon, Pa., and will at once enter upon his new duties.

Chas. T. Johnston, sales agent at Cleveland of the Republic Iron & Steel Co., was painfully injured April 16 by being struck by a street car. He expects to be able to go to his office in a few days.

H. R. Hume, formerly with Chas. Worthington, consulting engineer, has accepted a position with the Rust Boiler Co., of Pittsburg.

T. J. Joyce, of the Domhoff & Joyce Co., of Cincinnati, sails for Ireland this week. He will visit relatives in that country and seek to regain his health. He expects to be gone about six months.

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the New England Foundrymen's Association was held at the Exchange Club, Boston, Wednesday, April 13. B. M. Shaw, president, was in the chair. Henry Souther, of the Henry Souther Engineering Co., Hartford, Conn., gave a very interesting address on "Specifications for Cast Iron," along the lines suggested by the committee on testing cast iron and finished castings, appointed by the American Society for Testing Materials. Mr. Souther discussed the standard specifications for gray iron castings as proposed by the above committee. These were published in *The Iron Trade Review* of Feb. 11. These provided a sulphur limit of .08 percent for light castings, .10 for medium castings and .12 for heavy castings. Light castings were defined as those having any section less than ½ inch thick, and heavy castings as those in which no section is less than 2 inches thick. The quality of iron going into castings under specification is to be determined by means of an "arbitration bar," this bar to be 1¼ inches diameter and 15 inches long and cast on end. The breaking strength of this bar under transverse load is required to be 2,500 pounds for light castings, 2,900 pounds for medium castings, and 3,300 pounds for heavy castings. The speaker said that the round test bar was more reliable than a square one and by casting on end uniform structure was secured from top to bottom.

At the conclusion of Mr. Souther's address dinner was announced, after which business was disposed of in the usual manner.

A report was received from the committee on resolutions upon the deaths of Lorrine E. Stannard and S. K. Lovewell. The resolutions were accepted and a page in the records set aside for them.

Notice from the American Foundrymen's Association was read announcing that the annual convention would be held at Indianapolis on June 7, 8 and 9, and at St. Louis on June 10. On motion the chair appointed Messrs. John Magee, Fred F. Stockwell and Harry Gibby as a committee to look up the matter of transportation and other information.

Vice President Magee then presented the following memorial to the American Foundrymen's Association, and on motion the chair appointed John Magee, Arthur Gibby and Joseph Anthony as a committee to represent the New England Foundrymen's Association in the matter:

WHEREAS, we, the New England Foundrymen's Association, have recently had presented before us by Mr. Thos. D. West, a most original and instructive paper embodying new thought in regard to testing the hardness of packed bodies of sand constituting a mold for casting hard metals, and

WHEREAS, we have been shown in connection with said paper a novel device whereby the degree of hardness of said sand may be reliably measured, and

WHEREAS, it is at the present time impossible to obtain any exact information on this subject, except such comparative information, in many cases of rather doubtful value, as may be personally conveyed, therefore be it

Resolved, that we, the members of the New England Foundrymen's Association, through our undersigned committee, do hereby petition the American Foundrymen's Association to establish a committee of five members, or such number as shall seem best to its chairman, for the purpose of investigating, measuring and classifying the hardness of molds, to establish proper standards of measurement for same, and to list such classes of work as shall seem to them desirable, showing the most suitable degree of hardness for the body of the mold in each class of work.

A communication from the Philadelphia Foundrymen's Association inviting the New England Foundrymen's Association to attend a meeting to be held in conjunction with the Pittsburg and Philadelphia associations at Philadelphia on May 4 was read and on motion the secretary, Fred F. Stockwell, was elected to represent the association, and he was instructed to send a circular notice to the members of this association relative to this invitation.

A letter was read from H. A. Carpenter relative to meeting held in New York by the committee on St. Louis Foundry Exhibit building, which detailed the work done by the committee so far.

A. E. McClintock, secretary of the National Founders' Association, made a few remarks pertaining to the national conference held April 7 at Detroit by a joint committee representing the National Founders' Association and the Iron Molders' Union of North America. The effort to secure a national agreement on some questions which have been at issue between the two organizations was unsuccessful.

President Shaw presented the following subjects, important in foundry practice, for general discussion, and the interchange of views made the evening very interesting. We report the answers given, but omit the names of the participants in the discussion:

1. "How do you figure the cost of iron in the ladle?"

Ans. This question was replied to very briefly, the speaker producing a few rough specimens showing how the matter was handled at his foundry, figuring the average cost at ruling market prices.

Ques. "What disposition is made of the casting sprues?"

Ans. The sprues are charged back to the furnaces the same as scrap iron.

2. "What is your highest percentage of good castings obtained?"

Ans. We run a strictly jobbing shop and have not followed this matter up at all. I would say that I do not think it would be beneficial to a foundry of our circumstances to do it. I think it is all right for a specialty shop to follow it, but where they have different jobs coming in it is hard to do it. The profits in the stove business are so small that we have to follow the loss very carefully.

3. "What is your experience with anthracite coal in cupola practice?"

Ans. Our foundrymen when we first began to use coke stated that we could not get good castings with coke. We bought various carloads of coke and did not get the proper results. We were driven back to anthracite coal. Some of the foundrymen argued that they could not get their iron hot enough. I guess some foundrymen maintain at the present day that the iron from coke will not hold the heat as long as iron from anthracite coal. The greatest complaint we have had from trying to use coke in the beginning was that we could not get the iron hot enough. I really think from observation of the results that there is a little something in it and that iron does not carry the heat so well as it does with anthracite coal. After becoming educated to the use of coke we certainly would not use anthracite coal. We get better castings from the use of coke than we did from anthracite coal.

Ans. Referring to the previous speaker's remarks, I would state that we had the same trouble when we were using anthracite coal and changed over to coke, and we had to have our furnace reconstructed before we could use coke successfully.

Ans. It is a case of one man on one side of the street making his goods from anthracite coal and a man on the other side using coke. You can do one or the other; the question is, which is the cheaper? If anthracite coal was cheaper, I would advise using it, but I think the first speaker's position is explainable. I do not believe it makes a great deal of difference; it comes down to the common sense basis.

4. "When using iron which has been bought on analysis, specifying that the iron should run between certain fixed limits in carbon, silicon, phosphorus, manganese and sulphur, have you found the results the same, no matter what part of the country the iron comes from, provided it is melted under the same conditions and comes within the specifications; that is, whether it comes from Alabama, Tennessee, Virginia, Pennsylvania, or any other locality?"

Ans. I believe the physical properties are changed by locality. If the physical properties are considered and the chemical analysis, you will get just as good results. The irons I am using today come from different localities than those used six months ago. A few years ago foundrymen would not buy Southern iron. It is simply because they have not the physical properties of that iron. They have paid all their attention to the analysis. I might bring quite a number of illustrations on the subject and I think a great many iron men will agree with me that where they sell iron to foundries that do not have chemists and do not have analyses made of their iron, they recommend only irons that the founder knows from experience.

Ans. I believe what the previous speaker has said. I be-

lieve thoroughly in chemical analysis. The main object in specifying iron or buying iron by analysis is to insure regularity. If you specify between certain limits you will get the same results from that iron in my opinion. I believe you must become acquainted with the iron you are using before you can properly specify what the properties of the iron are.

The meeting adjourned at 9:45 p. m. The following were in attendance:

C. L. Newcomb, Deane Steam Pump Co.
W. B. Snow, B. F. Sturtevant Co.
J. O. Henshaw, N. S. Bartlett & Co.
Fred F. Stockwell, Barbour-Stockwell Co.
B. M. Shaw, Walker-Pratt Mfg. Co.
Henry Souther, Hartford, Conn.
L. S. Brown, Springfield, Mass.
Theo. Colvin Foundry Co.
A. E. McClintock, Detroit, Mich.
R. D. Cunningham, Deane Steam Pump Co.
John Magee, Magee Furnace Co.
E. Arthur Tatem, Crocker Bros.
E. E. Durrant, G. F. Warner Mfg. Co.
W. H. Coffin, Springfield Facing Co.
Geo. H. Lincoln, Geo. H. Lincoln & Co.
J. P. Winlock, Barbour-Stockwell Co.
Geo. A. Locke, A. B. Herrick, Smith & Wallace.
Fred A. Thomas, Pawtucket Foundry Co.
Walter M. Saunders, Saunders & Franklin.
M. C. Barry, S. E. French, Athol Machine Co.
Geo. H. Stearns, H. L. Paine, Walker-Pratt Mfg. Co.
F. D. Howard, Lamb Knitting Machine Co.
Geo. O. Sawyer, Hartford Laboratory Co.
Fred E. Hathaway, L. Brayton Foundry Co.
C. Hitch, Jr., American Tool & Machine Co.
C. R. Brown, Saco & Pettee Machine Shops.
W. S. White, J. S. White Co.
O. E. Nutter, Saco & Pettee Machine Shops.
W. H. Bense, Kinsley Iron & Machine Co.
W. A. Viall, E. J. Lyon, Brown & Sharpe Mfg. Co.
Wm. Sangster, B. F. Sturtevant Co.
M. J. Perault, J. F. Perault, Fitchburg Foundry Co.
Wm. C. Doherty, Doherty Bros.
Arthur E. Shields, Mansfield, Mass.
Wm. J. Breen, Agt., Hugh W. Adams.
Jos. L. Anthony, R. W. Leach, Weir Stove Co.
R. W. Whitemarsh, O. G. Thomas Co.
A. L. Nash, Dalton, Nash & Co.
Geo. B. Buckingham, Arcade Malleable Iron Co.
Edgar B. Pierce, Wheeler Foundry Co.
L. E. Harper, Becker-Brainard Milling Machine Co.
E. V. Hazard, Old Colony Foundry Co.
A. Fred Hammett, Frank D. Moffat & Co.
S. G. H. Fitch, Wm. Harvie, Vaughn Machine Co.
C. C. Boyden, Matthew Addy & Co.
Arthur W. Gibby, Mechanics Iron Foundry Co,
G. H. Carson.
Fred A. Hoyt, R. H. Penney, Barbour-Stockwell Co.
Geo. H. Gibby, Gibby Foundry Co.
J. W. Richardson, Howard & Bullough Am. Mach. Co.
J. E. Horne, J. H. Horne & Sons Co.
J. F. Lanigan, Davis Foundry Co.
L. H. Goodnow, Goodnow Foundry Co.

Foreign Engineers Coming in Large Numbers.

A large number of foreign engineers will visit the United States in the coming summer. It is estimated that from 1,500 to 2,000 will come from Great Britain alone. Members of the French Société des Ingénieurs Civils will leave Havre on Aug. 30 for New York and will later visit Buffalo, Niagara, Chicago, Pittsburg, St. Louis, Washington, Baltimore, Philadelphia, Boston, and return by way of New York. The Society of Chemical Industry has a four-day session in New York, beginning Sept. 7, and on the following Monday, Sept. 12, will leave for Philadelphia, Washington, Pittsburg, St. Louis, Chicago, Detroit, Niagara, Buffalo and Boston. Two hundred members of the Institution of Mechanical Engineers will meet at Chicago on May 31, with the American Society of Mechanical Engineers, as has already been detailed in these columns. The Institution of Civil Engineers will leave England for New York on Sept. 3. Nearly 600 members of the Iron and Steel Institution have decided to attend the meeting in New York, Oct. 24, 25 and 26. The program includes visits to Philadelphia, Pittsburg, Washington, Cleveland, Niagara, Buffalo and Washington, returning to New York on Nov. 10.

The property of the Anchor Rolling Mill, Corydon, Ky., has been sold for $7,500 to A. Waller & Co. The property has been in the hands of a trustee in bankruptcy for some time.

Clairton Steel Company to Go to the Steel Corporation.

(Special Telegram.)

NEW YORK, April 20.—The basis on which the Clairton Steel Co. is to be acquired by the United States Steel Corporation is not made public, but it can be stated on the authority of one of the leading negotiators that the purchase is assured. All that remains to be determined is the details. The matter was considered by the finance committee of the Steel Corporation yesterday and it is understood that a counter-proposition was made to the receivers of the Clairton Steel Co.—Wm. G. Park and H. C. McEldowney, of Pittsburg. It is believed that the Steel Corporation agrees to guarantee the interest on the $10,250,000 bonds of the Clairton Steel Co., and the difference between the receivers and the finance committee relates to $5,000,000 of short time notes of the Clairton company. The Crucible Steel Co. of America, in lieu of the stock of the Clairton Steel Co., all of which it owns, is to receive, according to one report, $1,000,000 in the 5 percent sinking fund bonds of the corporation. The Crucible Steel Co. of America is to take a stipulated yearly tonnage of steel from the corporation, the price being adjusted on a sliding scale, with pig iron as the basis.

Construction Outlook in the Pittsburg District.

The construction outlook in Pittsburg and the immediate vicinity is very bright for the coming season, and with labor disputes in the building lines practically all settled, building operations, many deferred from last year, will be greater and more numerous than in several years. An adverse money market may prevent the consummation of some of the railroad improvements, but in these cases the work commenced will be carried along into next year, and most of the contracts will be closed within the next few months.

The Wabash and Pennsylvania railroad Duquesne Way extensions will call for thousands of tons of rails and structural material, but it is hardly probable that work on these elevated tracks will be commenced this summer owing to legal difficulties. However, contracts will be let for the work this summer, if possible, so that construction can begin early next spring. The Baltimore & Ohio railroad is preparing plans for a new station which will shortly be submitted to the contractors, while new shops and yards of this road at Glenwood will shortly be contracted for. The Pennsylvania has plans under way for yard extensions at East Liberty. The Wabash will also build its South Side branch and a line into Greene County at an estimated cost of $10,000,000. The McKeesport & Clairton Connecting railroad will build a five-mile road between Clairton and McKeesport on which work will commence within 90 days. The Pittsburg Railways Co. is contemplating the erection of a bridge between Allegheny City and McKees Rocks for street car service, while the Eastern Railroad Co. will construct a steel bridge across the Monongahela at Pittsburg to Baldwin.

The Diamond Bank building, the contract for which was let to James Stewart & Co. last week, will be 14 stories high and is the largest building that will be erected in Pittsburg this season. A number of smaller buildings are being figured on and the indications are that the coming season will be unusually active. Among the new plants to be erected is that of the Railroad Track Equipment Co., which will be built at West Pittsburg. The construction of new trolley lines promises unusual activity, but many projected will no doubt be carried into next year.

Between 1,200 and 1,500 employes of the Illinois Steel Co., at Joliet, Ill., were thrown out of work April 16 for an indefinite period by the breaking down of the roughing engine in the billet mill. The shutdown affects the billet mill, converter and rod mills.

W. J. Schulze, formerly captain of the Stephens mine of the United States Steel Corporation, has resigned that to become general manager of the Tesora Mining Co., which owns and operates the Forest mine near Hibbing, Minn., and controls a number of undeveloped properties.

The Labor Situation.

AGREEMENT ON SHEET AND TIN PLATE SCALES.

After a session of almost two weeks the special convention of the sheet and tin plate workers of the Amalgamated Association at Pittsburg last week reached an agreement with the manufacturers in which they secured slight concessions from the agreement made with the general executive board of the association. The final agreement calls for a reduction of 18 percent on both the sheet and tin plate scales of 1903-04. On sheets the cost of rolling steel is to be the same as that of iron, the reduction of 18 percent applying to the rolling of steel and the 10 percent differential in favor of iron being wiped out entirely. The base has also been reduced from 2.50c to 2.30c, another concession to the sheet workers. As sheets of 28 gauge are now selling at 2.25c to 2.30c, an advance of 10 cents a hundred pounds will result in a 2 percent advance for the sheet workers. The card rate in the original 1903-04 scale on sheets was 3c but it was reduced to 2.50c on Jan. 1.

The tin mill scale was reduced 18 percent with the exception of the screw boy whose reduction is only 5 percent. The card rate was reduced from $4.20 to $3.40, and as tin plate is now selling at $3.45 a box, an advance of 5 cents would mean an advance to the tin workers. The scale became effective on April 4, and will continue operative until June 30. The American Sheet & Tin Plate Co. and the independent manufacturers acted together in conferring with the Amalgamated Association, James Campbell, of the Youngstown (O.) Iron, Sheet & Tube Co., being chairman for the manufacturers and James H. Nutt, secretary.

The catchers in the tin mills are dissatisfied with the reduction, and those employed in the Martin's Ferry, O., plant of the American Sheet & Tin Plate Co., went on a strike last Saturday, while those employed by the Pope Tin Plate Co., Steubenville, O., walked out this week. The agreement follows:

"It is hereby agreed by the joint conference of the sheet and tin plate manufacturers and a committee representing the Amalgamated Association, that the prices to be paid on sheet mills shall be 18 percent off steel tonnage prices of 1903 and 1904 scale, and that the prices for iron shall be same as steel. Also that on all material spread 10 percent reduction from scale of 1903 and 1904. Same to be based on 2 3-10 cent card rate.

"On tin mills it is agreed that all rates be reduced 18 percent on scale of 1903 and 1904 except the screw boy, whose rate is reduced 5 percent, same to be based on a $3.40 per box card rate.

"It is agreed that the above rearrangements of scales becomes effective April 4, 1904, and continue in force to end of scale year.

"The agreement of executive committee for 20 percent reduction on both trades for the period from March 21 to April 2 inclusive is hereby affirmed.

"The manufacturers, parties to this agreement agree to avoid any deviations from the scale in their mills governed by it."

OPPOSING NATIONAL ARBITRATION BILL.

E. F. DuBrul, commissioner of the National Metal Trades' Association, Samuel Gompers, president of the American Federation of Labor, and A. Furuseth, of the Federation, had the unusual experience, a few days ago, of finding themselves agreed in opposing a bill pending in Congress. Before a sub-committee of the House Committee on Labor, they made arguments in opposition to the Foster-Foss National Arbitration Bill, providing for voluntary or compulsory arbitration. Their reasons for opposing the bill were, however, widely different. Mr. Furuseth said that no matter how high minded the members of a national arbitration tribunal might be, they would eventually succumb to the influence of wealth, and such a tribunal would be a powerful organ through which employers could attain their ends. Mr. DuBrul declared that he did not believe in ready-made public opinion and that neither this bill nor any other like it would result in men giving up their inherent right to strike or lock out. The proper method of dealing with strikes, he said, is to enforce the law. Mr. Gompers argued that the bill would not stop strikes, but would tend to accentuate the differences between employers and employes.

NATIONAL METAL TRADES ASSOCIATION NOTES.

CINCINNATI, April 19.—Commissioner DuBrul has just returned from a two weeks' trip. He first visited Chicago and attended a district committee meeting of the association in that city and also interested himself in the brass workers' strike. He then went to Milwaukee and attended a district committee meeting of the Wisconsin districts. Last week Mr. DuBrul appeared before the Labor Committee of the House at Washington to argue against the passage of the arbitration bill. He visited Baltimore and reports that the labor bureau at that point is getting into good shape. In Philadelphia, he found that D. H. McPherson, secretary of the Philadelphia Metal Manufacturers' Association, was doing good work with the labor bureau. In New York he attended a regular meeting of the New York Metal Trades Association. Commissioner DuBrul reports that the New York Employers' Association is making good growth, and that the New York State organization is gaining in influence.

F. A. Geier, of the Cincinnati Milling Machine Co., treasurer of the association, who has been abroad for several months, sails for the United States on May 10.

An account of the handling and progress of the strike at the Fisher & Davis Co. plant at St. Louis, Mo., is furnished by J. W. Leigh, assistant secretary of the St. Louis Metal Trades Association. Mr. Leigh says in a letter to the secretary of the National Metal Trades Association: "The cause of the strike has been somewhat of a mystery to us as well as to the men that went out. The first demand of the business agent of the machinists' union was that a force of men recently employed on the night shift at the Fisher & Davis plant, should receive the same rate of wages as the day men doing the same class of work. Some of the employes on the day shift had been working for the Fisher & Davis Co., for a number of years and were, of course, worth more money than new men. Eleven men were working on the night gang on a 54-hour week schedule, and the combined weekly wages of these eleven men was but $2 less than the combined weekly wages of the eleven men occupying the same position on the day shift. For that reason the demand made by the business agent was refused. A complaint was then made to the association that the Fisher & Davis Co. had violated a section of the agreement existing between the St. Louis Metal Trades Association and the International Association of Machinists, District No. 9.

"In order that the dispute might be fairly considered, and justice done to both sides, a special meeting of our executive board was immediately called, to which a committee representing the machinists was invited. The sum and substance of the demand of this committee was for a minimum scale of 30 cents per hour. This was, of course, flatly refused, as this association does not recognize any minimum rate of wages, that question being left entirely with the individual employer and employe. During this meeting the employers suggested that if any points could not be amicably settled by the two committees present, an arbitration committee with final powers should be called. The machinists positively refused to consider arbitration, stating that the question of a minimum wage was not subject to arbitration and that they would not consider it. However, an arbitration committee of three was appointed to confer with an arbitration committee from the machinists' union. This committee held a meeting on Friday afternoon, March 11, at which time it was arranged to hold another meeting Monday afternoon, March 14, at 2 o'clock, both sides agreeing that no decisive action should be taken until after that date. Notwithstanding this agreement, Mr. Eugene Sarber visited the shop of the Fisher & Davis Co. between 11 and 12 o'clock, Friday night, during the absence of members of the firm, and at midnight the night shift quit work. On Saturday morn-

ing, March 12, the day force at starting time took their tools and left the shop.

"The agreement made by the St. Louis Metal Trades Association with the machinists' union (and which does not expire until May 20, 1904) has an arbitration clause stating that there shall be no cessation of work pending arbitration or conciliation. The action of the men in going out on a strike was immediately reported to the association and a meeting of the executive board was held at 12 o'clock on Saturday. A committee of five was appointed by the executive board to act for the association during the strike, and this committee met regularly every day at 1 o'clock, and not only directed the work of filling the shop but kept the members fully informed as to the progress of the strike by daily bulletins. The Fisher & Davis Co. notified all of their striking employes that unless they returned to work by noon Monday, March 14, their positions would be declared vacant and steps immediately taken to fill the same. As the men did not return to work at the expiration of the time limit, other machinists were sent from the employment department of this association to take their places. The shop was picketed continually, there being from five to fifteen pickets constantly on duty. A few of the men were drawn out from time to time, but their places were quickly filled and the pickets had very little effect on those who were working in the shop.

"On March 23 a committee representing the former employes of the Fisher & Davis Co. asked for and were granted an interview. This committee stated that they were desirous of returning to work but asked that the men working during the strike be discharged. Their request was refused. On Tuesday, March 24, the men asked that they be allowed to return to work unconditionally. They were told that those working on the day shift could return, but none of the men working on the night shift were re-employed. The day men returned to work Thursday noon, March 25. The strike lasted ten and a half days, the last eight days of which the shop was running continuously. It is worthy of note, showing the discipline of the members of the St. Louis Metal Trades Association, that no member of the emergency committee was absent or tardy at any of the daily meetings of the committee, and all of the recommendations of the committee were strictly adhered to by the large membership of the association. There have been several disputes during the year between the St. Louis Metal Trades Association and the unions, with which agreements have been entered into, showing a discouraging lack of respect on the part of the unions for the letter and spirit of their agreements."

LABOR NOTES.

Molders of the Moline Pump Co., Moline, Ill., have signed individual contracts covering a year's employment, the terms being practically the same as they had before they went on a strike some months ago.

About 300 men employed in the erection of the Dominion Iron & Coal Co.'s new coal washing plant at Sydney, B. C., have gone on a strike in support of a demand for an advance in wages.

In spite of the threats of the business agents, a large number of machinists employed in shops at Harvey, Ill., have deserted the union and returned to work. The union is attempting to fine machinists who have returned to work from $50 to $500. The employers insist upon the open shop and will make only individual agreements with the men. The companies affected are the Whiting Foundry & Equipment Co., F. C. Austin Mfg. Co., Buda Foundry and the Chicago Motor Vehicle Co.

The Dillon-Griswold Wire Co., Sterling, Ill., has increased the wages of common laborers from $1.50 to $1.75 a day, and all wire drawers will receive a 10 percent advance. The new schedule of wages became effective April 16. The company has more work on hand than it has been able to handle.

About 125 men employed by the Western Tube Co., Kewanee, Ill., are out on a strike for an increase in wages and against the piece work plan.

The strike of the boilermakers at the plant of the Henry Vogt Machine Co., Louisville, Ky., has been declared off by the union. The shop will hereafter be an open one. A few of the old men may be taken back, but the places of most of the strikers have already been filled by non-union men.

Iron Ore Meeting at New York.

(Special Telegram.)

NEW YORK, April 20.—The meeting of Lake Superior iron ore producers which has been postponed from time to time, opened yesterday at 11 a. m. at the offices of the first vice president of the United States Steel Corporation in the Empire building. Besides the Steel Corporation, the Cambria Steel Co. and the Republic Iron & Steel Co. among the large steel companies were represented. W. P. Snyder & Co. and the various iron ore selling firms of Cleveland were also represented. The session of yesterday lasted five hours during which the questions originally raised in the Cleveland meeting of February and discussed in the later meeting in New York, were thoroughly gone over. Little new light was thrown on the problem. The producing-consuming interests, that had contended for a $4 basis for old-range Bessemers, as against $4.50 last year, expressed a willingness to reduce this figure to $3.90. The merchant ore men, who at first had advocated $3.50, or a $1 reduction, and afterwards came to $3.80, said that price was not so vital as an agreement on output that would put all interests on the same footing as miners of ore. This developed the real line of cleavage between the two parties in the ore men's ranks. In view of the great reduction in the amount of ore required for this year, it was argued by the merchant ore men that all interests should reduce their shipments of the past two years proportionately. This would involve the purchase of some ore by the Steel Corporation and would also mean that companies having a large tonnage to ship under long time contracts would in some cases be limited for this year to ore enough to fill these contracts. It was pointed out that last year there were sales of ore below the established prices, and that long-time contracts opened the door for the cutting of prices. The fact that 600,000 to 700,000 tons of ore was not included in the agreement of recent years was also brought out. This tonnage did not affect the market in years like the past three but with only 5,000,000 or 6,000,000 tons of ore to be disposed of in the open market this year, according to some estimates, the outside ore became of more consequence, in its effect on prices.

It appeared yesterday that no agreement in open meeting was likely and an adjournment was taken last evening to 1:30 p. m. today. Meantime each side was to hold a separate meeting and settle on any concessions it was willing to make, these to be reported at the meeting of this afternoon. This meeting is still in session at this writing.

LATER.—It is reported that a basis of $3.50 for old-range Bessemers has been agreed upon and that details as to output have been left for adjustment by a meeting to be held later in the month at Cleveland. This is not definitely confirmed.

Carnegie Steel Company Furnaces.

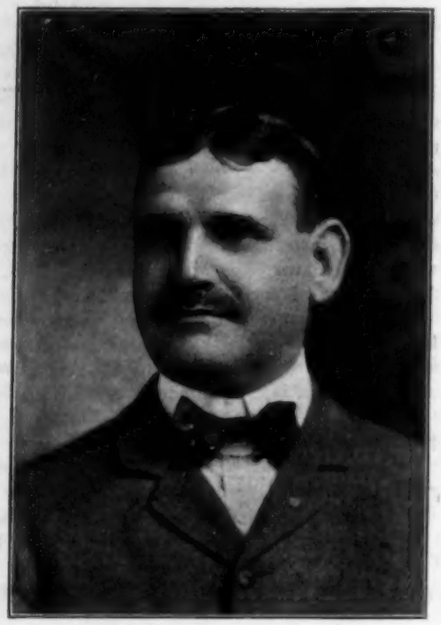
(Special Telegram.)

PITTSBURG, April 20.—Fires have been lighted at stack No. 2 of the South Sharon plant of the Carnegie Steel Co., and the furnace will be producing iron before the end of the week. The two Donora furnaces will not be blown in for some time, as the corporation does not need iron for delivery in the Pittsburg district, but is much in need of it at Sharon, New Castle and Youngstown. At the time the recent purchases of Bessemer were made it was thought that about 8,000 tons would be required for Pittsburg delivery, but later it was found that sufficient iron was being made in that district to supply all the steel plants there and the iron for Pittsburg was consigned to Valley plants. The Sharon stack is a new furnace and is built on the same lines as No. 1, which, although having only a rated capacity of 450 tons daily, has produced as high as 536 tons in 24 hours. It is doubtful if the open-hearth plant at Donora will be started before next fall, although practically ready at the present time. Until the steel plant is to be operated there is no need of starting the furnaces, as it would be necessary to ship the iron in pigs to Edgar Thomson or Duquesne, where plenty of iron is now being made for the steel plants.

The S. Obermayer Co. has taken an order for a complete foundry outfit for the Yeatman High School, of St. Louis, Mo.

OBITUARY.

James D. Smith, secretary and treasurer of the J. D. Smith Foundry Supply Co., Cleveland, died April 20, at his home in that city. Mr. Smith was born Sept. 5, 1858, in Cincinnati. Four months before he was 21 years of age he started in business with the Fitzmorris & Smith Foundry Facings & Supply Co., of Cincinnati. A few years later the company was reorganized as the J. D. Smith Foundry Facings & Supply Co. In December, 1899, Mr. Smith consolidated his business with that of S. H. Chamberlain, proprietor of the Cleveland Facing Mills, and removed with his family to Cleveland. The business has been very prosperous and Mr. Smith was widely and favorably known among foundrymen throughout the United States. The company manufactures all kinds of foundry



JAMES D. SMITH.

facings and blackings, supplies for iron and brass foundries and patternmakers, and imports plumbago, silver and black lead. Mr. Smith leaves a widow, three sons, two of whom were in business with him, and a married daughter.

William Bingham, one of the oldest and most favorably known hardware merchants of the Central West, died at his home in Cleveland, April 17, aged 88 years. Mr Bingham was born in Andover, Conn., March 9, 1816. Twenty years later he went to Cleveland and entered the hardware house of George Worthington, serving as a salesman, and for another two years holding an interest in the business. In 1840 Mr. Bingham purchased the business of Clark & Murphy, and the house of W. Bingham & Co. was established. The business developed rapidly and included jobbing in large quantities of iron and steel as well as of hardware. In recent years the company has had in its employ about 100 men. Mr. Bingham was a director in several banks and trust companies of Cleveland, was a director and vice president of the Cincinnati, Wabash & Michigan Railroad Co., and was in many ways actively identified with the business, social and religious life of Cleveland. Although he never desired public office, Mr. Bingham served several years as a member of the city council, of the State Senate of Ohio for one term, and in 1876 was honored by President Grant with appointment as a member of the Indian Commission. Mr. Bingham also rendered valuable service as a member of the city sinking fund commission of Cleveland.

Andrew M. F. Watson, who is said to have been the first American who ever directly represented English steel interests in the United States, died April 13 at his home in Philadelphia, aged 82 years. In 1850 he first became identified with the business which he subsequently made the pursuit of his life, becoming connected with the firm of Wilson, Hawksworth & Ellis, of Philadelphia. In 1854 he was sent for by Joshua Moss & Co., of Sheffield, England, then regarded as the largest manufacturers of bar steel in the world, and became their representative in the United States. Later, the firm was known as Moss & Gambel, and Mr. Watson continued as their agent. In 1878 he became the general sales agent of the Midvale Steel Co., and to him is attributed, in large measure, the great success of that corporation. He retired from active business in 1892. During a period in which the making of trips across the ocean was by no means as common as it is today, Mr. Watson crossed the Atlantic twenty times in connection with his business.

James Gifford died April 9, in the house in which he was born, at Hudson, N. Y., aged 75 years. In 1856 Mr. Gifford became a member of the foundry firm of E. Gifford & Sons, of Hudson. In 1863 the firm name was changed to Gifford Bros., as it has since remained.

De Witt Clinton Carroll, one of the pioneer manufacturers of Pittsburg, died April 8, aged 75 years. He was born in Pittsburg and when a young man became the senior member of the firm of Carroll & Snyder, which in time was changed to Carroll & Porter, boiler manufacturers. Mr. Carroll was also connected with the Magnetic Boiler Cleaning Co. and several other industries in Pittsburg. He retired from business several years ago.

Thomas Allen died at his home in Chicago, April 11, aged 67 years. He was born in Philadelphia and went to Chicago 22 years ago, engaging in the corrugated iron business. He founded Allen's Cornice & Corrugating Works, of which he was president.

W. D. Drake died at his home in Cleveland April 18, aged 67 years. He was born in Portsville, N. Y., and moved to Cleveland in 1870. From 1879 to 1881 he was engaged in the railway supply business. From 1882 up to about five years ago he was a member of the Drake & Wiers Co., dealer in railway supplies. He was a director of the Empire Rolling Mill Co. and vice president of the National Safe & Lock Co.

The Allis-Chalmers Co. announces that in connection with the important extensions of its business recently adding to its lines of manufacture gas engines, steam turbines, hydraulic machinery and electrical machinery, it has organized a department of publicity, of which Arthur Warren has been appointed manager. Mr. Warren trained himself for the technical side of the work, in which he has been engaged for some years, by entering the machine shop and acquainting himself with shop practice. Later he traveled and in 1883 he joined the staff of the Boston *Herald*, with which he was connected for 14 years, being its London correspondent from 1888 to 1897. In the latter year he returned to the United States at the invitation of George Westinghouse and organized the Westinghouse Publishing Department, whose work has been most noteworthy. He resigned in February, 1904, and had arranged to sail for Europe when he was invited to take up the publicity work of the Allis-Chalmers Co. His equipment for the new position is pre-eminent.

A rumor has been current in New York that the Allis-Chalmers Co. will suspend paying dividends on the preferred stock. E. D. Adams, a heavy stockholder, states that the directors have not decided upon such action. He added that the regular directors' meeting for action on this quarter's dividend was set for April 15, but that they did not meet. Mr. Adams could not give any assurance that the dividend would be declared, as he stated that he did not know when the directors would meet to take action on the matter.

Building for March in 24 principal cities of the United States shows an increase in buildings erected over the corresponding period a year ago. Permits were issued in these cities, according to reports to *Construction News*, for the construction of 8,190 buildings, aggregating $31,487,608 in cost, against 7,623 buildings, aggregating $38,643,409, an increase of 507 in the number of buildings and a decrease in cost of $7,145,891, or 18 percent.

The Pennsylvania Railroad Co. will erect a four-story brick and stone shop on the site of its present blacksmith shop at Altoona, Pa. It will contain the driving box and frame departments.

MOTORS OF WIDELY VARYING SPEEDS.

The application of the electric motor to the driving of a variety of machinery has developed the fact that special designs of machines are necessary to fulfil the requirements of the various classes of work. The requirements may be grouped into the following main divisions: First. That class of machinery requiring a fixed speed independent of the load and for which a standard shunt wound motor is especially suitable on account of its automatic regulation of the speed within very close limits. Second. That class of machinery requiring frequent starting and stopping under load and which does not require constant speed and in which the operation of the machine is at all times under the control of the workman by means of a lever, wheel or some similar controlling device. For this class (cranes, hoists and rolling mill machinery are examples), the series

FIG. 1.—VARIABLE SPEED MOTOR.

FIG. 2.—UNIVERSAL CONTROLLER.

wound motor is well adapted on account of its ability to exert a strong starting torque with a comparatively small flow of current and its characteristics of running at high speeds under light loads and low speeds under heavy loads, which is frequently the normal condition of operating such machines. Third. That class of machinery in which an approximately constant speed is desired, but in which the perfection of regulation given by a shunt motor is not necessary and in which the occurrence of sudden and wide fluctuations of load or the necessity of frequently starting or changing the direction of motion of a mass having large inertia requires the ability to develop a large torque with a small flow of current. For this class, comprising printing presses, elevators, punches and shears, a compound wound motor is suitable, as it combines the characteristics of the strong starting torque of the series motor with an approximation to the automatic

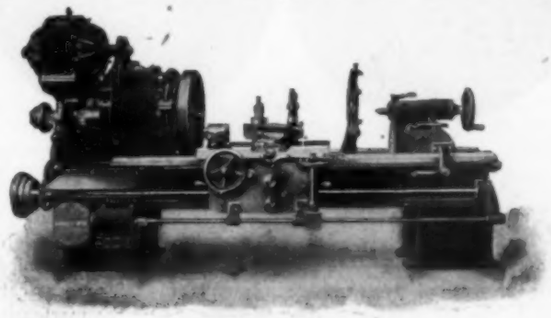


FIG. 3.—VARIABLE SPEED MOTOR SYSTEM APPLIED TO LATHE.

regulating feature of the shunt motor. There is a fourth class of machines requiring a great variation in speed, with the heaviest torque or pulling power at the slowest speed and a less torque at a higher speed, the actual horsepower or rate of doing work being the same at all speeds. Lathes, boring mills, milling machines, drills, with many others, belong to this class and to secure the greatest output from them it is necessary to run the work at the greatest cutting speed and take the heaviest cuts the tool will stand, whatever may be the nature of the work. In order to accomplish this satisfactorily the horsepower of the motor must not fall off when run at the low speeds required for large diameters.

It is for this class of service that a line of variable speed motors has been designed by the Commercial Electric Co., of Indianapolis, Ind. The general construction of these machines is similar to that embodied in the constant speed motors which have been made by the company for the past ten years. The new design accomplishes the variation in speed by means of a double commutator machine having two windings. Each winding is, however, of the same size conductor or of the same ampere capacity. A speed controller is furnished for making the necessary combination of these armature windings and for varying the field strength to secure intermediate steps between the armature combinations. Fig. 1 shows one of these motors and Fig. 2 is a view of the controller when arranged in a separator case. The controllers are compact and the changes from minimum to maximum speed are easily and quickly made. The controllers are reversible. The controller has a rotary switch by which the motor is started, stopped and reversed, while the speed control is set at any desired point. The speed controller and the starting switch are combined in one piece of apparatus in a compact case. This can be placed at any desired point on a machine tool or mounted on a stand and conveniently located by the side of the tool. Fig. 3 illustrates the former and a handle on the apron of the lathe is by bevel gears and a couple of rods in touch with the mechanism in the controller case. Fig. 2 shows the separate controller.

The variable speed control is claimed to have the following characteristics: A range in speed of four to one in twelve uniformly graded steps without overlapping. The greatest torque, or pulling power, at the slowest speed, so that pieces of large diameter may be turned with as heavy cuts as smaller pieces. A constant maximum horsepower at all speeds; it does not fall off in capacity at the low speeds when the greatest effort is usually required. A practically constant speed at all loads when the controller is set at a given point. It does not slow down when you strike a deep cut and speed up when the tool runs out into air. A practically constant efficiency at all speeds and a high efficiency at all loads. It wastes no power in heating resistance coils ordinarily used to control the speed. It can be installed on any standard two-wire or three-wire direct current system, running from the same wires as the constant speed motors or lights already installed. It does not require a special generating plant, motor-generator set or a special system of wiring. Therefore a single machine, or any number, can be installed without the consideration of an extra expense for special generators and wiring involved by other systems.

Meeting of Ohio Furnace Interests.

Several Ohio blast furnace men, believing that meetings for the exchange of views on market conditions and for a closer personal contact would be of mutual benefit, recently called a meeting for the discussion of such a plan. It was held in Columbus, O., on Friday, April 15, and was attended by representatives of ten Ohio furnaces. No formal action was taken, but it was the sense of the meeting that if such gatherings could be held at regular intervals the better understanding and acquaintanceship that would result among men working along competitive lines would be good for all concerned. It is understood that another meeting will be held on Friday, April 22, at which the condition of the market on foundry and forge irons will have attention.

It is announced that the Lake Superior Consolidated Co. will ship ore from the Helen mine in the Michipicoten district as usual the coming season, notwithstanding the financial troubles of the company. Its future depends to a large extent on the action of the Ontario parliament upon the bill now pending, which guarantees the bonds of the company to the extent of $2,000,000.

The American Car Brake Co., of Cleveland, has been incorporated with a capital of $50,000. The company expects to build a plant in some city in Northern Ohio. The incorporators are: Theodore E. Felt, Lyman J. Glenn, Robert K. Mickey, Albert J. Robson and George Reese.

B. Haskell and Ed. E. Hughes have been appointed receivers for the Franklin Rolling Mill & Foundry Co., Franklin, Pa. It is expected that arrangements will be made to continue the business.

Relation of Microstructure of Metals to Rate of Cooling.*

BY W. CAMPBELL, PH. D.

When a molten metal or alloy is cooled down to its freezing point, it began to crystallize out as grains, dendrites or more or less well defined crystals. Upon the rate of cooling depends, in most cases, the resultant structure. If a metal passes through its freezing point very slowly, its structure will be comparatively large; if rapidly cooled, its structure will be fine.

In the case of some metals and many alloys, however, other changes occur far below the freezing point, resulting in a re-arrangement in the solid. Examples of such changes are seen in iron and steel, the bronzes, the alloys of copper and aluminum of copper and antimony, etc.

In the case of iron and steel we are dealing with a single series of alloys as we pass from pure iron to steel and finally to cast iron. Fig. 1 is based on Rooseboom's diagram (*Zeits. für Phys. Chem.*, 1900, xxxiv.), and shows the changes which take place with change of temperature and of composition. The line AB marks the evolution of heat due to the crystallization of dendrites of iron, whilst BD corresponds to the separation out of graphite (as kish). At about 1,100 degrees C. the dendrites or grains of iron can hold up to 2 percent of carbon in solid solution and therefore between 0 and 2 percent carbon the alloys are solid solutions of carbon in iron or martensite. When more than 2 percent carbon is present, the graphite-martensite eutectic makes its appearance and surrounds the dendrites and grains of martensite as a groundmass. This is seen in Fig. 2, magnified 21 diameters. The alloy contains 2.9 percent carbon, 1.44 percent silicon, 0.23 percent manganese. When the alloy cooled down to the temperature of the line AB the dendrites of martensite began to crystallize out and continued to grow, enriching the mother-liquor in carbon until at a little above 1,100 degrees C., the latter contained about 4.3 percent carbon, when it solidified as alternate laminæ of graphite and martensite. On the other hand, alloys containing more than 4.3 percent carbon would separate out graphite on reaching the temperature BD, while an alloy having the composition B or 4.3 percent carbon would freeze out on reaching the point B as alternate laminæ or particles of graphite and martensite and would contain neither free (dendrites of) martensite nor free graphite. Such an alloy is seen in Fig. 3, magnified 72 diameters. Thus the line aBC corresponds to the evolution of heat caused by the solidification of the graphite-iron eutectic or groundmass. Below A*a*BC everything is solid.

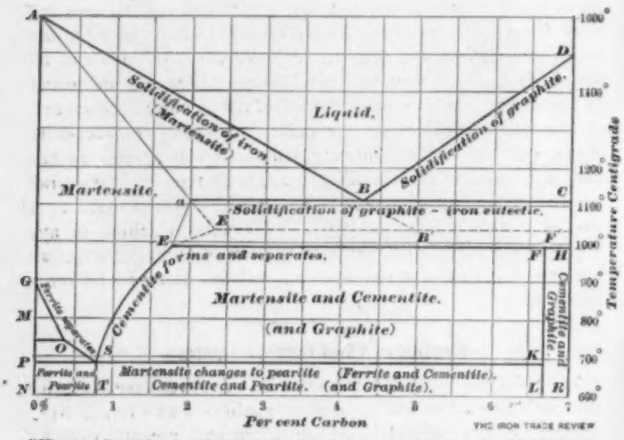


FIG. 1.—DIAGRAM OF CHANGES IN IRON AND STEEL, WITH CHANGES IN TEMPERATURE AND CARBON.

As the temperature falls the martensite can no longer retain 2 percent carbon in solid solution and we get graphite separating out along the line *a*E, thus reducing the dissolved carbon to about 1.8 percent at 1,000 degrees C. At this point a great change in the solid tends to occur. The martensite (1.8 degrees C.) is no longer in equilibrium with graphite and tends to react with it to form the carbide of iron, Fe_3C, called cementite. This reaction, however, is very slow and we usually find graphite below 1,000 degrees C. due to lag. But as the temperature falls a change occurs within the martensite itself, and this can best be explained by considering what happens in the alloys from 0 to 1.8 percent carbon, or the steels proper.

In the case of steel, solidification begins when we pass the temperature marked by the line AB, and is complete when A*a* is reached. On the other hand, reheating to the neighborhood of A*a* causes "burning," as Stansfield has shown,† due to a partial melting around the grains of martensite.

Steels may be classed in three divisions: those with less than 0.8 percent carbon or S percent; those containing 0.8 percent, and those with more than 0.8 percent carbon. Steels with less than 0.8 percent carbon consist entirely of martensite above the temperature marked by the line GOS. As the temperature falls the martensite acts exactly as a liquid and on reaching the line GOS pure iron or ferrite separates out and enriches the remaining martensite in carbon, until at just below 700 degrees C. the residual martensite contains 0.8 percent carbon in solid solution. At this point, PS, recalescence occurs and the martensite splits up into alternate laminæ of ferrite and cementite (or pure iron and carbide of iron). The arrest in cooling produced by this transformation

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

RATE OF COOLING AND MICROSTRUCTURE.

is known as Ar_1. Thus between the temperatures GOS and PS the steel consists of ferrite and martensite, while below PS it consists of ferrite and pearlite, if slowly cooled.

In the case of steels containing more than 0.8 percent carbon, as the temperature falls to the curve ES, the martensite becomes supersaturated with cementite which separates out on the curve ES, and thus impoverishes the martensite in carbon, until, at the temperature S, as before, it contains 0.8 percent carbon, when recalescence occurs and pearlite is found. Thus above ES the steels consist of martensite alone; between ES and the line PSK they consist of cementite and martensite, while below SK they consist of cementite and pearlite.

Lastly, steel containing 0.8 percent carbon consists of martensite until it reaches the temperature S, when recalescence occurs and pearlite is formed. Thus we have neither free ferrite nor free cementite. When a steel is quenched from a temperature above PSK the change from martensite into pearlite is partly or wholly prevented and the product is hard. The structure of martensite, quenched from a high temperature, consists of grains with a peculiar striated appearance when etched. Of course the higher the temperature

*Abstract of lecture delivered to Philadelphia Foundrymen's Association, April 6, 1904.

†Journal Iron and Steel Inst., 1903, II.

to which the steel has been heated above the change point PSK (called Ac_1 on heating), the coarser the grain.

While Fig. 3 shows what is called the "eutectic" of martensite and graphite because it is the alloy which freezes at the lowest temperature, pearlite or the steel with 0.8 percent carbon is called the "eutectoid" because it has nearly all the characters of a eutectic, but it does not freeze at the lowest temperature; it forms from the solid martensite at the lowest change point.

To return to our alloys of martensite and graphite: The martensite contains about 1.8 percent carbon in solid solution; in other words, it is a high-carbon steel and therefore as the temperature falls it becomes supersaturated with cementite which separates out along the line ES until finally the residue has the composition S or 0.8 percent carbon, when recalescence occurs and pearlite is formed. The resulting structure is seen in Fig. 5, magnified 72 diameters, in which the hard white cementite is seen surrounded by the groundmass, which is pearlite.

Thus our alloys should consist of martensite + cementite + graphite (by lag), within the area FESK, and of pearlite + cementite + graphite (by lag) below the temperature SK or 690 degrees C.

Coming next to white cast irons, we find that instead of having martensite set in a matrix or eutectic of graphite and martensite, the groundmass is composed of alternate cementite and martensite. This is shown in Fig. 4, magnified 21 diameters, which is a section of washed metal, 3.5 percent carbon. The dendrites of martensite have, in cooling, rearranged themselves into cementite and pearlite as before. Crystallization occurred exactly as in the case of Fig. 2, excepting that the groundmass or eutectic solidified at a temperature where martensite and graphite were not in equilibrium but where martensite and cementite were. Hence we get a matrix of cementite and martensite which subsequently rearranged itself into cementite and pearlite as before. In the curve, the line E'B'F' is taken to represent the solidification of the cementite-martensite eutectic. There can be no doubt that the silicon and other impurities present play a most important part though their influence on the position of E'B'F' has yet to be exactly determined.

Similar changes in the solid occur far below the freezing point in the case of bronzes and other alloys. These changes partly or entirely obliterate the structure due to the original crystallization and are therefore of the utmost importance, for upon the structure, in a great measure, the physical properties depend.

American Society for Testing Materials.

The seventh annual meeting of the American Society for Testing Materials will be held at Atlantic City, N. J., June 16, 17 and 18, 1904. It is expected that this will be the most successful meeting in the history of the organization. Secretary Edgar Marburg, in announcing the meeting, notes that the membership of the society, which at the fifth annual meeting held at Atlantic City, June 12-14, 1902, was 175, is now 440, or more than two and a half times as great. The increase in the size of the Proceedings of the society is also noteworthy. In the first four years the published matter averaged 67 pages a year. The last two annual volumes contain 388 and 490 pages respectively. The executive committee will offer an amendment to the by-laws increasing the membership dues from $3 to $5 a year.

It is announced that owing to the war between Russia and Japan the congress of the International Association for Testing Materials which was to be held in St. Petersburg Aug. 18-24, 1904, has been postponed to 1905.

A Coatesville, Pa., dispatch refers to a large steel plate turned out at the Worth Brothers' mill—142 inches wide by 558 inches long, and weighing 16,120 pounds. The plate will be shipped to the St. Louis Fair for exhibition.

The Tabor Mfg. Co., of Philadelphia, announces that it has opened an office in Boston, for the sale of the Tabor vibrator molding machines, in charge of C. S. Lovell, at Room 84, Mason building, 70 Kilby street.

CUNARDERS WITH STEAM TURBINES.

The Cunard Steamship Co. has arrived at a decision of considerable importance from an engineering point of view. Two high speed vessels are planned with steam turbine installations. The use of the steam turbine for passenger steamers is of course not new. Excursion steamers on the Clyde, Scotland, have been equipped with turbines and are running satisfactorily. it is claimed, with a coal economy of 25 percent for the same duty previously performed by paddle wheel ships and reciprocating engines. Other turbine vessels built and in course of construction include ships for some six different routes between Great Britain and the Continent, Ireland and the Isle of Man. The Canadian lake service will have similar equipment, together with the Australian and New Zealand trade. An important competitor of the Cunard Steamship Co., the White Star line, has also ordered two turbine driven ships and the Cunard company itself has already chosen a similarly propelled vessel but of moderate speed. There are in addition to these a considerable number of private yachts to be equipped in like manner.

The size and speed of the new steamships are sufficiently remarkable to call especial attention to the progress of the turbine in competing with the reciprocating engine. The falling off in economy at low speeds has no bearing of consequence upon the adoption of the turbine drive for the fast transatlantic passenger service. Such vessels run for 99 percent of the time at full speed and in this respect are entirely in a different class to coastwise ships, which are seldom out of sight of land and make short trips. The speed contemplated by the new Cunarders is from 24½ to 25 knots and from 65,000 to 70,000 h. p. is expected to drive the 760-ft. hull at the required rate. The committee of experts recommends four parallel screw shafts and that the diameter of the turbines be increased to allow of a speed of 140 revolutions per minute. This is a considerable reduction from current practice in turbine propulsion where the speed varies from 300 to 500 revolutions per minute, but is much higher than the reciprocating engine rate. The two outside shafts will be driven by the high pressure turbines and the screws on these shafts will project furthest from the hull. The high pressure turbines will be separately connected to low pressure turbines on each of the inner shafts. Two other turbines are fitted on the inner shafts for running astern. The machinery is so designed that the breakdown of one shaft will not affect the working of the other three. The size of the installation is made impressive by the assertion that the coal consumption daily will exceed 1,000 tons.

Some surprise is to be expected at the small percentage of space gained by the substitution of turbines for reciprocating engines in the Cunarders. The saving in space is given as but 2 percent and is not comparable with the estimates often made. The reason for the extremely small percentage is undoubtedly in the few turns per minute specified for the propeller shafts. It is well understod that the turbine blades should have a high peripheral velocity to obtain the desired economical effect from the steam pressure. A reduction in turns per minute therefore implies an increased diameter to attain the requisite circumferential velocity. The larger diameters of casing necessary for these turbines will thus bring the space requirements so much nearer to the reciprocating engine type of prime mover.

The Flickinger Wheel Co. and the Galion Gear Co., both of Galion, O., were placed in the hands of receivers April 15. The gear works were destroyed by fire several years ago with a large stock of goods on hand and the company experienced considerable difficulty in adjusting the loss, which was heavy, with the insurance companies. A new plant has been in course of construction and was nearly completed when new financial difficulties came upon the company.

The Muskingum Valley Steel Co., Zanesville, O., manufacturer of black and galvanized sheets, has had five mills in its plant for about two years, but for several months has been operating but three of the five. On March 28 the company again put into commission mill No. 4, and on April 25 it expects to put in commission mill No. 5, thus giving it the full productive capacity of the plant.

A MACHINE FOR LOADING ORE BARROWS.

The Park Mfg. Co., of Chicago, has designed and is building an ore loader of considerable interest. The one illustrated by the two halftones is in use at the furnaces of the Illinois Steel Co. The machine, which is a substitute for a number of shovels, is backed into the stock pile and elevates the ore into charging barrows. An inclined metal frame is mounted on a four wheeled truck. The frame supports an oval channel containing the scoops or conveying blades and these are connected to an endless chain. A pair of sprockets, one at each end of the machine, are driven by clutches and bevel gears from an electric motor mounted above the conveying system.

The loader can be operated with electricity, compressed air or steam, as may be desired, and is adapted to run on rails or with the traction wheels, as shown. It may be moved around the yard and backed into the pile of ore by its own power, the two rear wheels being geared and connected to the motor by a clutch. The front wheels are on a king bolt and by a suitable steering attachment can be turned in any direction. When the steering wheels are turned, the appropriate driving wheel is automatically disconnected from the motor and the loader is then propelled by the outside wheel and may be turned in its own length.

Fig. 1 shows the machine set into the base of the ore pile with the barrow at the rear. Fig. 2 illustrates the reverse view. The frame is pivoted over the truck at the center so that it may be raised for movement about the ore yard and on application to the pile the front edge is lowered to the ground and forced into the material. The machine will elevate material up to a distance of five feet, but in excess of this an auxiliary conveyor is attached. This is of the belt type and is connected to a pivot at rear of the truck in order that the belt conveyor may handle material parallel to the unloader or at any other angle.

The loader is handled and steered by one man at the right of the machine. There is a main clutch lever A for operating the scoops of the conveyor and the handle B throws in the propelling clutches for driving the truck. C is a screw for adjusting the height of the front edge of the excavating channel nad D is the steering lever. E is the starting bar for the motor and F is the current breaker. The arms sweep the load off the ground into and up the carrying channel and as these arms travel at the rate of from 60 to 80 feet per minute, the capacity of the machine can be easily realized. The channel is 18 inches wide, the greatest depth (near the inner wall of the sprocket casing) is 16 inches and at the outside is 8 inches deep, giving an actual carrying capacity of 1½ cubic feet for every foot of chain travel. The arms may be spaced at any suitable distance dependent upon the material to be handled. It is claimed that the method of sweeping up the load instead of grabbing it does not break up the material.

The loader is built of structural material with steel castings. The chain to which the arms are attached is of special design and is made of drop forged steel with cold rolled steel pins and has an ultimate strength of 80,000 pounds. The motor is of 10 h. p. The height of machine over all is 8 feet 2 inches, with a clearance at elevation of more than 5 feet for loading into a 5-foot car. The width over all is 5 feet 3 inches and the total weight about 3 tons. The capacity is rated according to material, up to 400 cubic yards per hour.

FIG. 1.—ORE LOADER SET IN PILE AND DELIVERING TO CHARGING BARROW.

D. M. Lefever, Sons & Co., Syracuse, N. Y., have recently conferred with the board of trade of Toledo, O., with reference to moving their plant to that city, but they inform us that there is now no prospect of the plant being moved. A plan which is much more likely to be carried out is the proposed consolidation of Lefever, Sons & Co. with the Young Repeating Arms Co., of Columbus, O. The stockholders of the latter company have sent a committee to Syracuse to confer with Lefever, Sons & Co. concerning the consolidation. The Lefever plant has been in operation for nearly 30 years.

The Kent Mfg. Co., of Kent, O., formerly the Railway Speed Recorder Co., announces the change of name. The firm manufactures hand and power core machines.

GERMAN PIG IRON OUTPUT DOUBLED IN TEN YEARS.

We have already given the statistics of German pig iron production in 1903. The statement of output by the principal producing districts in 1903 as well as in 1901, over which an important advance was made last year, is contained in the following:

District.	1903. tons	1901. tons
Rhenish-Westphalia	4,009,227	3,014,844
Siegen, Lahn and Hesse-Nassau	718,106	634,712
Silesia	134,780	640,199
Pomerania	134,770	122,644
Saxony	Nil.	20,942
Hanover-Brunswick	357,779	341,985
Bavaria, Thuringia, and Wurtemburg	159,403	113,813
Sarre	735,968	618,317
Lorraine and Luxembourg	3,217,328	2,278,431

The table shows that the production of the Rhenish provinces now exceeds that of Lorraine and the Luxembourg. At the close of 1903, out of 313 blast furnaces in Germany 297 were active. In 1903 the output of foundry pig was 1,798,773 tons, as compared with 1,512,107 tons in 1901; that of Thomas pig, 6,277,777 tons, as compared with 4,452,955 tons; that of spiegel pig, 703,130 tons, as compared with 563,014 tons; and that of puddling pig, 859,253 tons, as compared with 793,780 tons. The production of Bessemer pig declined to 446,701 tons, as compared with 464,036 tons in 1901. The advance made in German pig iron production in the past ten years appears in the following:

Year.	Tons.
1894	5,380,038
1895	5,464,501
1896	6,372,575
1897	6,881,166
1898	7,312,766
1899	8,143,132
1900	8,520,540
1901	7,880,081
1902	8,402,660
1903	10,085,634

The output has nearly doubled during the ten years. Extending the comparison back somewhat further, the progress made appears still more remarkable, as in 1890 Germany only produced 4,658,451 tons of pig iron and in 1885 3,687,433 tons. Thirty years ago—in 1873—the production of German pig stood at only 2,240,574 tons. In the same year the production in the United States was 2,560,961 tons.

Imperial Steel & Wire Company.

The Imperial Steel & Wire Co., of Collingwood, Can., is in the market for a complete equipment for a 50-ton wire plant, including cleaning house, drawing frames and galvanizing plant, also for a 25-ton unit wire nail plant. The buildings of the company are about completed. When finished this plant will be one of the most modern in construction and layout in Canada. The plant will have a capacity of from 50 to 100 tons daily of finished wire goods.

American Steel Foundries.

The American Steel Foundries has sent to its stockholders a statement of its financial condition, the accounts having been audited by the Audit Co., of New York. It shows that the company has accumulated, as of Feb. 29, and now has net surplus and current net earnings of $537,491. It is also stated that the outlook for business in the immediate future is materially better and that the company has discounted and paid all current debts and liabilities, and has at present time $713,338 cash in hand and in bank. It is said that the cash and convertible resources of the company are more than sufficient to meet all expected business requirements after paying the 1½ percent dividend. The stockholders have also received the following interim balance sheet, as of Jan. 31 last, certified to by the Audit Co. of New York:

Assets—Purchase price of properties Aug. 1, 1902, $30,500,000; net current assets taken over $1,895,021, less depreciation, $233,807—$1,661,214; additions to plant since Aug. 1, 1902, $454,012; investments—American Steel Bolster Co., $500,000; American Steel Foundries of Missouri, $25,000; Georgia Car Mfg. Co., $15,000; Florence Water Works, $13,422; Davis Locomotive Wheel Co., $2,000; miscellaneous, $1,000; total investments, $556,422; notes and bills receivable—car trust notes, $266,544; miscellaneous, $21,386; accounts receivable less reserves—current, $811,309; old companies, $96,422; raw material, finished products, supplies, etc., $551,921; cash on hand and in banks, $610,027; insurance paid in advance, $14,547; deferred charges to operations, etc., $98,362; total assets, $32,319,738.

Liabilities—Preferred stock issued, $15,500,000; common stock issued, $15,500,000; bonds of American Steel Casting Co. outstanding (due Nov. 1, 1902), $71,000; accounts payable, $198,212; pay roll, taxes and interest, $73,608; sundry reserves, $29,564; profit and loss account—balance July 31, 1903, $835,203; adjustment of inventories, etc., $123,555; balance July 31, 1903, as adjusted, $711,648; preferred dividend paid Sept. 1, 1903, $232,500—$479,148; net income for six months ended Jan. 31, 1904, before charging depreciation on buildings, $300,706; preferred dividend paid Dec. 1, 1903, $232,500—$68,206; balance, $547,354; total liabilities, $32,319,738.

FIG. 2.—LOADER REVERSED TO SHOW BLADES OF CONVEYOR.

Hamilton King, the United States minister to Siam, reports that he is forwarding to the state department tenders and specifications for a large supply of rolling stock for the Siamese state railways. This covers an order for 187 cars of different kinds and a large number of separate parts, such as brakes and wheels. It is expected that this order will be followed soon by a larger one for locomotives and iron bridges. The minister has made earnest efforts to have bids for railway material opened to the world. Formerly most of these supplies were purchased only from one or two European countries. It is largely due to the efforts of the American minister that the principle of open bids in all the departments of the government has been established in Siam. The minister, however, says that there appears, in many instances, to be no adequate response to the efforts to obtain foreign markets.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Carroll-Jamieson Machine Tool Co., Batavia, O., has been incorporated with a capital of $10,000. Incorporators are: A. V. Carroll, P. F. Jamieson, M. Jamieson, F. Davie, A. Heinrici, F. White, P. Rapp, J. L. Moore and F. M. Kain.

The Southern railway, through its purchasing department at Washington, D. C., has been buying new machinery for its various shops and is now in the market for cranes to be installed at Spencer, N. C. Specifications call for two 65-ton, one 10-ton and one 5-ton electric traveling cranes.

Bids for cast iron pipe and special castings for the extension of the water systems of Cincinnati are to be in hand May 3. Requirements for this year are from 16,000 to 18,000 tons.

The Snyder Automatic Signal Co., Galesburg, Ill., has been incorporated with a capital of $20,000, to manufacture signals for highway crossings. The company expects to begin to manufacture the signals within 30 days.

The Christie Heating & Iron Co., East St. Louis, Ill., has been incorporated with a capital of $2,000. Incorporators are: E. Christie, S. B. Christie and H. Christie.

The Standard Mouthpiece Machine Co., New York City, has been incorporated with a capital of $10,000 to manufacture all kinds of machinery. Incorporators and directors for the first year are: Thomas Dimond, J. F. Williams, New York City, and J. S. McQuilleny, Passaic, N. J.

The American Electric Machine Co., New York City, has been incorporated with a capital of $50,000 to manufacture electrical machinery. Incorporators and directors for the first year are: E. M. Waring, C. E. Francis and Lillian Mancher, all of Brooklyn.

The Leap Frog Railway Co., New York City, has been incorporated with a capital of $50,000 to manufacture machinery. Incorporators and directors for the first year: P. K. Stern, M. Rosen, F. M. Ashley, of New York.

The Headson Tool Co., Lafayette, Ind., has been incorporated with a capital of $150,000.

O'Rourke & Co., contractors for the East River tunnel of the Pennsylvania railroad, are receiving bids for engines, boilers, hydraulic machinery, air compressors and other equipment necessary for the building of the tunnel, including power stations which are to be constructed at each end. It is expected that the contract for the tunnel lining will be let within a few days. A large amount of iron manhole castings will also be required.

The Japanese government proposes to build a navy yard which will require about $500,000 worth of machine tools. Considerable secrecy has been maintained in regard to the specifications, but bids are being submitted for lathes and other machinery through Takata & Mitsui & Co. and O'Kura & Co., Japanese exporters and importers of New York City. German manufacturers are understood to be quoting exceptionally low prices.

A number of railroads are buying machinery to a limited extent. The Delaware & Hudson contemplates the erection of shops at Wilkesbarre, Pa., and also intends to make numerous other improvements. The Lehigh Valley has been in the market during the past week for further machinery for its shops at Sayre, Pa., and it is said that more purchases will be necessary before the shops are completed. The Southern railway has purchased about $94,000 worth of machinery for installation in its shops at Spencer, N. C., and Manchester, S. C. The Interborough Rapid Transit Co. has placed an order for the entire equipment of its shops at Forty-Eighth street and Seventh avenue, New York. The Pittsburg, Chicago & St. Louis railroad will make extensive improvements at its terminals, yards and shops in Chicago.

L. Busler, 252 Albermarle street, York, Pa., who is interested in the establishment of nail works in that city, informs us that he will be in the market for new machinery. The plant will turn out 400 kegs of nails a day.

The International Steam Pump Co., New York, which recently placed an order with the Niles-Bement-Pond Co. for a number of cranes for its new plant at Harrison, N. J., has purchased a 10-ton locomotive crane of the Industrial Works, Bay City, Mich., and will issue revised specifications for additional cranes, about 12 in number, soon to be purchased.

The Hoover Wagon Co., York, Pa., is in the market for machinery for equipping its new plant which replaces the one recently destroyed by fire. The new plant will have a main building, two stories, 80 x 230 ft., and a one-story brick building 43 x 195 ft., and another one-story building, 50 x 200 ft., for the wood working departments.

J. A. Mathieu, Box 267, Georgetown, S. C., asks prices on two electric cranes capable of lifting 5,000 pounds 18 feet high and moving load 6 feet 8 inches on the bridge.

Apex Equipment Co., No. 11 Broadway, New York, wants one 30 or 40-h. p. locomotive-type boiler mounted on wheels; also one 20-h. p. upright engine.

The Bedell Structural Steel & Foundry Co., New Orleans, has been incorporated with $100,000 capital, to operate foundry; Charles Bedell, president; William T. Coats, vice president; and J. A. Littlefield, treasurer.

The National Brake Co. has been incorporated at Buffalo, N. Y., capitalized at $50,000, and will manufacture in that city brake appliances for cars, automobiles and other vehicles. The incorporators are: Griffin S. Ackley, Buffalo; Wm. B. Brewster, Syracuse, N. Y.; and O. S. Mills, Tuckhannock, Pa.

Fires and Accidents:—

The large machine shop of O. & L. Oatman, Medina, O., was destroyed by fire April 15. The firm manufactures an eave trough hanger and had all its winter work in the shop and wareroom. Loss, $5,000.

The Knoxville Iron Co., Knoxville, Tenn., suffered loss by another fire April 10. Damage amounted to about $1,000.

The plant of the White Mfg. Co., manufacturer of plumbing and brass goods, Chicago, was destroyed by fire April 13. Loss, $62,000. A strike has been in progress for four weeks. It is suspected the fire was of incendiary origin.

Fire in the St. Louis plant of the American Radiator Co., April 8, caused a loss of $4,000.

A gasoline explosion at the Cadillac Automobile Works, Detroit, April 13, caused a fire which badly damaged the plant. Loss is covered by insurance.

The machine shop, round house and blacksmith shop of the Powers-Simpson Logging Co., Hibbing, Minn., were destroyed by fire a few days ago. The buildings will be re-constructed and full equipment installed. A temporary machine shop has been provided.

New Construction:—

William H. Fisher, for eleven years foreman in the plant of the Utica Pipe Foundry Co., Utica, N. Y., has resigned to go in business for himself. He has purchased a site in Utica and begun the erection of a foundry.

The Wenzelmann Mfg. Co., Streator, Ill., manufacturer of farm implements, has decided to move its plant to Galesburg, Ill., where it will erect two buildings, each 40 x 200 ft., and a third, 60 x 200 ft.

F. E. Myers & Bro., Ashland, O., have let the contract for an addition to their foundry, which will be built at a cost of $3,000.

The Youngstown Bronze Co., Youngstown, O., has decided to erect a machine shop. The building will be 80 x 100 ft. and will be equipped with a 40-ton electric crane and other up-to-date machinery.

Downie-Wright Mfg. Co., York, Neb., is preparing plans for a new foundry, to be equipped with all modern improvements, such as air hoists, pneumatic rammers and chippers, sand sifters and other labor saving devices.

The annual meeting of the stockholders of the Riverside Bridge Co., Martins Ferry, O., was held a few days ago. The financial statement was very satisfactory. Notwithstanding the destructive fire during the year, the company's assets have increased. As soon as the insurance is paid on the building recently destroyed by fire, a new structure will be erected. Officers and directors were chosen as follows: President, N. E. Whittaker; vice president, Henry Schmulbach; secretary, F. J. Park; general manager, C. F. Dickinson; board of direc-

tors: N. E. Whittaker, Henry Schmulbach, John A. Howard, F. J. Park, Ernest G. Smith, Harrison Bettis and O. R. Wood.

The Vitrified Wheel Co., Westfield, Mass., which manufactures emery and other high-class grinding wheels, has bought a site and will erect a building 140 x 40 ft., with an L 45 x 40 ft. The company has been occupying a rented plant for nearly 25 years and has contemplated for some time the building of a plant of its own.

Owing to the opposition of the people of Los Angeles, Cal., the Wishart Mfg. Co. will not build its foundry near Library Park in that city. The company has withdrawn its application for a permit and expects to build elsewhere in Los Angeles.

The Pennsylvania Railroad Co. is planning to make extensive improvements to its coal and ore docks at Toledo, O.

The North & Judd Mfg. Co., of New Britain, Conn., is making extensive improvements on its plant. The old annealing building is being converted into an iron foundry and other improvements being carried forward.

W. C. McFarland, Orange, Texas, will erect a machine shop and foundry at Alexandria, La.

The Garwood Foundry & Machine Co., Garwood, N. J., is building a new foundry at a cost of $10,000.

Hunt, Helm, Ferris & Co., Harvard, Ill., makers of agricultural implements, are planning to build a new foundry, 40 by 100 feet.

The Keystone Mfg. Co., of Sterling, Ill., is making changes which will very greatly increase the capacity of the plant.

The Galesburg Machine Works, of Galesburg, Ill., have completed the foundry which will be run in connection with the machine shop.

The Murray Co., Dallas, Texas, manufacturer of cotton gin machinery, is planning to add a new foundry to its plant.

The Columbia Foundry Co., of New Richmond, O., will erect a new foundry 80 x 125 feet.

The Watson-Stillman Co., 204 East 43d street, New York, which recently purchased the Jackson Architectural Iron Works at Aldine, N. J., has about completed the improvements to the original shops and has built several substantial additions, into which the company expects to move May 1. The machine shop proper is 100 x 180 ft., to which has been added a 30-ft. gallery and a new extension 60 ft. by 120 ft., making the main building 300 ft. long. The pattern shop and several other buildings have been erected and more are to be built later in the season.

The building of the new wheel foundry of the Pennsylvania Railroad Co., at South Altoona, Pa., at a cost of $1,000,000, has been completed and will be ready for operations June 1. The equipment will cost over $300,000. The foundry will have a daily output of 900 wheels.

The blast furnace of the Lookout Mountain Iron Co., Battelle, Ala., will probably be completed and in operation about July 1.

The Reliance Boiler Works, Oshkosh, Wis., have been improved by the building of a 30-ft. addition and the installation of considerable new machinery.

The Frost Wire Co. will move from Welland, Ont., to Hamilton, Ont., and will erect a plant in the latter city. The building will be two stories, 150 x 80 ft.

The Rock River Mfg. Co., Dixon, Ill., is rapidly getting its plant in readiness for operation. This company is build- and equipping the plant started by the Sterling Wrench & Tool Co. The machine shop is already built. Equipment for the foundry has arrived and will soon be installed. The company will make a specialty of automobile wheels, but will also do a general foundry business.

The Pittsburg and Valley Districts:—

The Banner Electric Co., Youngstown, O., has been incorporated with $100,000 capital. The company has been operating successfully for several years and owing to its growth its incorporation was deemed advisable. N. L. Norris, Thomas Carr, F. C. Kirschner, C. S. Cook and O. U. Cassidy are the incorporators.

The offices of the Bessemer Coal & Coke Co., Johnstown, Pa., are to be removed to Pittsburg, although the operating headquarters will remain at Johnstown. At the annual meeting held last week officers were elected as follows: C. J. Brokenshire, Cleveland, president; George H. Love, Hites, Pa., vice president; J. C. Trask, Cleveland, treasurer; E. M. Love, Somerset, Pa., secretary. The board of directors is composed of the above officers and the following: Capt. J. C. Harrison, Louis Demmler, Wilford Johnston, R. E. McKisson, F. W. Wood, E. H. Baker and Dr. J. C. Lange. The company is capitalized at $500,000 and owns 2,600 acres of coal land.

James Stewart & Co. have been awarded the contract for the erection of the 14-story Diamond National Bank building, Pittsburg, work on which is to commence at once and to be completed in March next year.

The Sharon, Pa., plant of the American Steel Casting Co. has been closed indefinitely owing to a strike of molders who demand a restoration of the wages paid previous to the recent reduction.

An additional ten mills at the South Sharon plant of the American Sheet & Tin Plate Co. were placed in operation this week and the entire mill is now in full operation for the first time in many months. The operation of this mill in full is due to the reduction of 18 percent accepted by the tin workers.

The offices of Julian Kennedy, mechanical engineer, Pittsburg, have been removed from the Smith building to the Bessemer building, where commodious quarters have been secured.

Clairton furnace No. 2 of the Clairton Steel Co., Pittsburg, was blown in last Wednesday after an extended idleness. The new stack at this plant, No. 3, is to be blown in the latter part of this week.

At the Monessen, Pa., tin mill of the American Sheet & Tin Plate Co., six new furnaces are to be built. The razing of the old furnaces has already been commenced.

The Pittsburg Steel & Spring Co., Pittsburg, last week shipped two helical springs which are claimed to be the largest of their kind ever manufactured. They are 27½ inches in diameter and have a free height of 34 inches. When closed solid they are nine inches high. They are made from 1⅞ inch steel and the bars were each 533 inches in length. The weight of each spring is 246 pounds. The springs are 17 times the diameter of the bars from which they were made.

Heyl & Patterson, Pittsburg, manufacturers of elevating and conveying machinery, have applied for a Pennsylvania charter, the incorporated company to be styled Heyl & Patterson, Inc. E. W. Heyl, W. J. Patterson, W. A. Heyl, Martin H. Hager and Charles Donnelly are the applicants for incorporation.

The George M. Bole Construction Co., Pittsburg, has applied for a Pennsylvania charter for the purpose of engaging in the manufacture and fitting of structural work. George M. Bole, John Jobson and J. H. Bialas are the incorporators.

General Industrial Notes:—

The Rockmart Stove & Foundry Co., Rockmart, Ga., recently incorporated, is a co-operative concern with a capital of $12,000. The company manufactures cooking stoves and heaters and makes a specialty of light gray castings. It has purchased three acres and built a plant 80 x 120 ft. The equipment has been purchased and the company expects to begin operations by May 1.

The Titusville Iron Co., Titusville, Pa., is preparing to enlarge its business. This will be done, not by erecting additional buildings, but by more systematic and complete utilizing of machinery and foundry departments. New machinery has been installed.

The Thompson & Sons foundry in Beloit, Wis., which was almost totally destroyed in a recent flood and fire, will resume operations soon. The patternmakers are now constructing new patterns to take the place of those destroyed, so that there will be no delay in the work.

The Marengo Foundry Machine Co., of Marengo, Ill., capital $20,000, has been organized to succeed Kelley & Co., of the same place. The officers of the new company are: A. W. Kelley, president; G. A. Bennett, vice president; W. E. Bardell, secretary; R. B. Willard, treasurer.

The New Haven Mfg. Co., New Haven, Conn., Leslie Moulthrop general manager, has had Dodge & Day, of Philadelphia, go over its entire equipment with a view of bringing it up to date. Complete intererior re-arrangement of the

shops is contemplated, and it is probable a number of the old machine tools will be replaced by modern tools. The near future may see this an electrically driven shop. The machine tools manufactured by this company will be redesigned by Dodge & Day, to meet the requirements of high-speed tool steels, as well as the growing demand for modern, motor-driven apparatus.

M. B. Blair, formerly manager of the Parkersburg Casting Co., Parkersburg, W. Va., will engage in the foundry business for himself at New Martinsville, W. Va.

Frank Dunbar, of Pittsburg, and A. G. Marshall, of Philadelphia, have purchased the Johnson Machine Works, Upper Sandusky, O. The company will be reorganized with a capital of $100,000.

W. E. Brown and E. D. Ellsworth have leased the property of the Michigan Iron Works, at Manistee, Mich., and will manufacture cast iron molds for making cement building blocks. They were formerly engaged in this business at Union City, Mich., and are now moving their machinery from Union City to Manistee.

The American Motor Carriage Co., Cleveland, which had been in the hands of a receiver for some months, has been sold to a syndicate of Cleveland people organized by C. W. De Mooy, Charles F. Laughlin and others. The new owners have organized the American Automobile Co., with a capital of $50,000, and will continue to manufacture automobiles.

The Brown Corliss Engine Co., of Corliss, Wis., has just received an order from the Phillips Insulated Wire Co., of Pawtucket, R. I., for one 14 and 28 x 42-inch tandem compound condensing Corliss engine and one 18 and 36 x 48-inch tandem compound condensing Corliss engine.

The Bounds Wire Fence Co., general office No. 210 Merchants and Manufacturers' Bank building, Columbus, O., was organized on April 6, and purchased the business and the patents of Perry M. Bounds, a practical fence man and patentee. Heretofore Mr. Bounds has carried on the same business in his own name, but owing to the fact that he felt the need of a larger capital and better business facilities, the company was organized and purchased his interests. It is the policy of the company not only to build and sell the Bounds wire fence, but as soon as possible and practicable to build and operate a factory for the manufacturing of all kind of wire and wire fence supplies. The officers of this company are: Robert J. Beatty, president; Frank McCafferty, vice president; Perry M. Bounds, secretary; and C. W. Drake, treasurer. They are connected with several other business enterprises in Columbus.

The rolling mill of the Glen Iron Works, Allentown, Pa., was torn down last week. Chains were fastened around the pillars and posts supporting the roof of the building, which was 200 ft. square, and attached to a locomotive on the Lehigh Valley railroad. At a signal the locomotive pulled the supports from under the roof and the entire structure came down with a crash. This plant was first placed in operation in 1870 and was dismantled a number of years ago.

The stockholders of the Battle Creek Iron Works Co., Ltd., Battle Creek, Mich., have decided to close the works, and it is probable that they will never be opened again under the same management. There have been dissensions among the stockholders and a reorganization is expected.

The Birmingham Iron & Steel Co., which recently purchased the plant of the Hood Machine & Foundry Co., has begun the conversion of the property into a steel casting plant. J. R. McWane, formerly of Richmond, Va., is general manager.

The William F. Remppis Ornamental Iron Works, Reading, Pa., have been awarded the contract for the ornamental and architectural wrought and cast iron work for the new capitol building at Harrisburg, Pa. The contract price is about $100,000.

In the hearing of receivership proceedings of the United Steel & Tin Plate Co. in the United States Court at Columbus, O., last week, it developed that there is a probability of the company being reorganized. The company has plants at Newark, Marietta and Newcomerstown and was forced into the hands of a receiver some time ago.

The Bay City Gas Co., Bay City, Mich., has awarded the American Car & Foundry Co. the contract for a minimum of 13 and a maximum of 15 miles of cast iron pipe for gas mains, ranging from 4 to 16 inches in diameter.

The McArdle-Parker Machinery Co. has been organized at Birmingham, Ala., with a capital of $50,000. The company will do a general machinery business and will be the agent for the Niles-Bement-Pond Co., and the R. K. LeBlond Machine Tool Co. The company will have agencies in Birmingham and New Orleans. It will not do any manufacturing.

The American Machine Co., Cleveland, has changed its name to the American Machine & Mfg. Co.

The Carnahan Tin Plate & Sheet Co., Canton, O., advises us that the recent increase in its capitalization was made, not for improvements at the present time, but simply in changing over the company from a New Jersey corporation to an Ohio corporation.

The rail mill of the Colorado Fuel & Iron Co., Pueblo, Col., has resumed operations. Orders for rails sufficient to keep the mill in operation for several months are said to be on hand.

Fires have been lighted in six of the eleven open hearth furnaces of the Pencoyd Iron Works, Philadelphia, and it is expected that by April 25 the other five furnaces will be ready for charging. During the winter all the open hearth furnaces have been relined and otherwise repaired. The management is experiencing some trouble in getting skilled men, as during the long shut-down many of the skilled workers found employment in other parts of the country.

The plant of the Falls Rivet & Machinery Co., Cuyahoga Falls, O., recently sold at a special master commissioner's sale to Edwin Seedhouse, president of the company, will install new machinery and, in addition to its old lines, will turn out some new products.

Light Rail Mills.

The light rail mill of the Union Rail Co., Huntington, W. Va., for rerolling heavy section rails into standard sections was placed in operation last week. The mill was erected at the plant of the Huntington Tin & Planished Plate Co., all of the latter's equipment having been removed. It is an 18-inch mill and was furnished by the George A. Hogg Iron & Steel Foundry Co., of Pittsburg. This is operated by a 32 x 48 high speed engine. The output is estimated at 150 tons, operating double turn. The heavy rail sections are heated in a 30-foot continuous natural gas fired heating furnace capable of taking 18 foot lengths. The rails in the furnace are moved on water cooled pipes, 2½ inches outside diameter and with inside diameter of .57 inch. This thickness gives an increased wearing surface and the cooling is accomplished as well as with pipes having a thinner wall. From the pipes the rails are pushed on to a forehearth where all uneven heating disappears and are ready for rerolling into smaller sections. The location of the plant affords excellent shipping facilities, having direct connections with the C. & O., Norfolk & Western and B. & O. railroads. A. F. Baumgarten is president; D. J. Baumgarten, vice president; and L. A. Pollock, secretary. The main offices of the company are in the Farmers' Bank building, Pittsburg.

The Henry R. Worthington hydraulic works at Rapelyea and Van Brunt streets, Brooklyn, are shortly to be removed to Harrison, N. J., to occupy the new $2,000,000 plant of the International Steam Pump Co., now nearly completed. The Brooklyn site consists of two city blocks, or about four and one-half acres, while the Harrison plant is located on a 35-acre tract and contains 18 acres of floor space. The Worthington company was founded in 1843 by Henry R. Worthington, the inventor of the duplex steam pump and other hydraulic devices. About 2,000 men are employed in the South Brooklyn works and many will undoubtedly go to the new plant at Harrison, which will accommodate from 5,000 to 6,000 men. The Brooklyn works will probably be sold, the company having already disposed of its large foundries at Elizabethport, N. J.

After being shut down during the winter months, the iron mines of the Colorado Fuel & Iron Co. at Sunrise, Wy., are now in operation and the shipment of ore to Pueblo has been begun. Extensive improvements, including a hoisting plant, have been made at the mines.

DOUBLE CRANK PRESS, OVERHANGING TYPE.

The use of large cutting, blanking and forming dies, as well as gangs of punches and dies which extend over a large surface, requires a press particularly adapted to the work in order to obtain satisfactory results. Double crank presses for this purpose are naturally more desirable than the single crank type. A late design in the double crank presses of the overhanging type is illustrated herewith. The two pitmans are connected by bevel gears and spindle and this connection is simultaneously adjustable. Thus the slide can can be easily and quickly raised or lowered to accommodate dies of different thicknesses, and this without throwing the guides out of alignment.

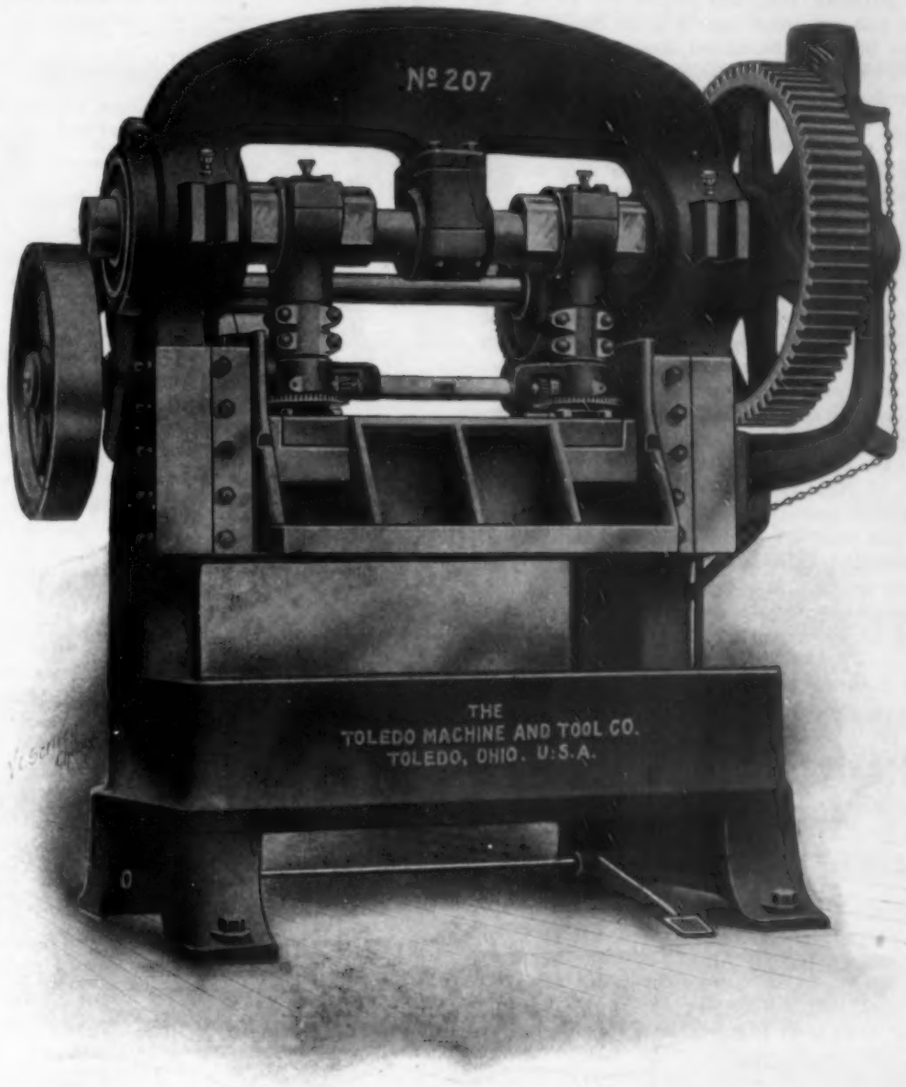
The press is fitted with the Toledo sliding block clutch with patented gravity releasing device. It is claimed that one-third less power to operate the press is required than if a friction clutch is employed, because with this clutch the large gear has direct connection with the balance wheel shaft and is kept constantly in motion. The patented gravity releasing device does away with the objectionable feature of having the clutch release dependent upon springs.

The pattern made for this press allows modifications in many of the dimensions, such as the distance between uprights, opening in bed, distance from bed to slide and the motion of slide.

The press is designed for heavy work, such as cutting, blanking and forming large pieces, shearing sheet steel, operating large forming or stamping tools, gang punches, etc. It may be arranged for perforating straight or staggered rows of holes; for punching any size or number of holes, single, double or in groups. It is built in many sizes for light or heavy work. The larger sizes are adapted to punching, shearing and coping on structural iron and bridge work, ship building, boiler making, pressed steel car trucks and for a general line of bar iron and pressed steel work.

The press shown has a bed area of 29½ inches front to back and 79½ inches from right to left. The balance wheel is 38 inches in diameter and the large gear 48 inches in diameter. Motion of slide is 3½ inches.

The press is built by the Toledo Machine & Tool Co., of Toledo, O.



A NEW PRESS.

The American Lafrance Fire Engine Co., of New York City, has filed with the Secretary of State a certificate of increase of capital stock from $1,000 to $2,000,000, to consist of half 7 percent non-cumulative preferred and half common stock. The stockholders are Royall C. Victor, Charles R. Ganter, Albert S. Ridley and William J. Curtis. This is the company which will take over the assets and plants of the International Fire Engine Co. The latter passed through receivership and a short time ago the court ordered that the assets be sold in the ordinary procedure of winding up the affairs of a bankrupt concern.

On the petition of Charles W. Mackey, president; J. W. Rowland, vice president, and J. S. Coffin, a director, E. Haskell and E. E. Hughes have been appointed receivers of the Franklin Rolling Mill & Foundry Co., Franklin, Pa. The company is embarrassed for want of working capital, and it is believed the receivership will place it in a better position in this regard.

TRADE PUBLICATIONS.

The American Sheet & Tin Plate Co., Pittsburg, is sending to the trade two artistic booklets issued respectively by the American Tin Plate Co. and the American Sheet Steel Co. which offer valuable information to those connected with the metal and building trades. That issued by the American Tin Plate Co. contains a brief history of iron and its application to roofing and traces the manufacture of roofing tin from the early days to the present time. Full details are also given on the construction of a tin roof, together with tabulated information useful to all interested in the building trades. The booklet issued by the American Sheet Steel Co. contains fine illustrations of various views of the company's sheet mills, also tables showing weights of sheets and bundles of standard sizes of galvanized sheets, Woods' refined sheets, Woods' patent planished iron and corrugated sheets, net prices per pound and per square foot at given discounts, etc. Either booklet or both will be mailed free upon request by addressing W. C. Cronemeyer, advertising agent, 310 Carnegie building, Pittsburg.

The catalogue of the Archer Iron Works, of Chicago, is accompanied with a card illustrating the exhibit to be in the Liberal Arts building at St. Louis. The firm manufactures barrows, cars and trucks in many styles and sizes and the catalogue shows a number of these arranged for regular and special service in mines, foundries, steel plants, etc.

A pamphlet on steam pipe covering and its relation to station economy received from the Philip Carey Mfg. Co., of Cincinnati, describes the method and results of a remarkable test made by H. G. Stott. This gentleman as superintendent of motive power of the Manhattan Railway Co., of New York, was entrusted with the task of determining which of several pipe coverings was the best for their purpose and the manner in which he went about the investigation is quite as interesting as the results.

H. A. Rogers, of New York, has a new catalogue on the Scotch gauge glasses made by John Moncrieff. These are furnished plain and reflecting (red enamel) and with a number of other specialties, lubricator glasses, gauge glass cutters, washers and packing rings are shown in considerable variety. The pamphlet has some useful advice on the use of gauge glasses for steam boilers.

Bulletin No. 35 is devoted to the multipolar motors made by the Northern Electrical Mfg. Co., of Madison, Wis. These motors are shown attached to many standard machine tools and cranes and the details of construction are presented with especial reference to their use under trying conditions. The illustrations are well chosen. A circular shows the Northern generator direct connected to a Racine engine and another one illustrates a Root & Vandervoort engine belted to a dynamo, each set for lighting service. Both units are briefly described.

Several pamphlets from Hammacher, Schlemmer & Co., of New York, treat of planes, saws and saw sets, tools and supplies for shipping departments, etc. The catalogues are uniform in size but varied in color of covers for ready reference and are thoroughly indexed.

Publication has been made in pamphlet form of the paper read before the 11th general meeting of the Society of Naval Architects and Marine Engineers held in New York Nov. 19, 1903, on "Non-Corrosive Nickel Steel Boiler Tubes," by Albert Ladd Colby, of the Orford Copper Co., New York. It is accompanied by full-page illustrations of 30 percent nickel steel tubes of the Shelby Tube Co.

The pneumatic hoist catalogue of the Chicago Pneumatic Tool Co., of Chicago, describes a number of general hoists, geared hoists and trolleys combined, stationary winding drums, cylinder air hoists, telescopic air hoists, cranes, foundry elevators and jib cranes. There are illustrations and lists of numbered repair parts and other information of service in the purchase and maintenance of pneumatic apparatus.

The two cycle marine engines built by Termaat & Monahan, of Oshkosh, Wis., are neatly illustrated and described in a small but attractive catalogue.

The Logan Mfg. Co.'s equipment and plant at Phœnixville, Pa., for the manufacture of gray iron castings in green or dry sand are briefly described in a small catalogue.

A small catalogue from A. G. Hathaway & Co., of Cleveland, enumerates air brake pins, knuckle pins, rivets, spikes, tie rods, turnbuckles, nuts, bolts, washers, exhaust heads, oil and gas furnaces, etc.

The neat price list of the Bourne-Fuller Co., of Cleveland, dealer in ion, steel, pig iron and coke, is accompanied with a circular on a high speed steel, "Cutmore." The circular gives instructions for working the new steel which is claimed to have unusually good cutting qualities.

The plumbers' handbook of Pierce, Butler & Pierce Mfg. Co., of Syracuse, N. Y., illustrates a large part of the plumbing supplies made by this company and is at the same time not too large for carrying in the pocket.

The Westinghouse Mfg. Co., of Pittsburg, has a circular of the direct current series wound motor for hoisting purposes. This use requires a large starting torque and the efficiency charts and illustrations of the motor in detail and at work are of interest.

Catalogue No. 15 is the second edition of the B. F. Sturtevant Co., of Boston, relative to blowers, engines, motors, generating sets, forges, steam heating apparatus and other products. This is a condensed catalogue and the various items are dealt with at greater length in other and special publications.

British Iron Trade Notes.

A cargo of American machinery, comprising two blowing engines and a large quantity of pumping plant was recently unloaded at Middlesbrough, Eng. The consignment weighed 1,000 tons and was valued at about £50,000. The machinery is for Bolckow, Vaughan & Co., Ltd.

At the annual meeting of the Harvey United Steel Co. in London it was stated that the main Harvey patent expires in England towards the end of 1905, in France, Italy and Austria in 1906, in America in 1908, and the licenses under the Krupp patent on December 31, 1908. The directors have recently purchased another patent. It is called the Charpy process, and is expected to prolong the life of the company in the way of royalties.

The production of Bessemer pig iron for the market in England has been far less profitable than in the United States. At the recent annual meeting of the Barrow Hematite Steel Co., Ltd., the chairman said that the unsatisfactory state of trade in pig iron could be judged from the fact that out of 34 furnaces in operation on the west coast at the beginning of 1903, it had been found necessary to put 12 out of blast before the year closed, and the price of west coast hematite pig iron was quoted on the Glasgow market at 58s. 6d. at the beginning of the year, and at 52s. 6d. in December last. Every 2s. per ton fall in the price of pig iron meant £30,000 a year to this company. The output in the steel making department last year was about 14,000 tons, or three weeks' make less than in the previous year, and the selling price was also lower. Their iron ore mines continued to give a fair quantity of ore, but there had again been a decrease in the output. No effort had been spared in making explorations in the hope of finding new deposits, but these had not been successful.

At New York, April 11, Justice William J. Kelly handed down a decision under which the plant of the Morse Iron Works and Dry Dock Co., of Brooklyn, is to be sold at auction in foreclosure proceedings brought by the Washington Trust Co. as trustee for the mortgage bondholders. This is the outcome of the troubles which organized labor brought on in the form of strikes and incessant agitation, making the concern unable to do business.

The Champion Tool Co., of Conneaut Lake, Pa., has leased the plant of the Eagle Iron Works, Meadville, Pa., and will remove its machinery as soon as possible from its present works.

No. 3 blast furnace of the E. & G. Brooke Iron Co., Birdsboro, Pa., was blown in April 16, the repairs having all been finished. The work of repairing the Robesonia blast furnace, Robesonia, Pa., has progressed so rapidly that it was fired April 15.

UTILIZING EXHAUST STEAM

After your engines have converted into work the very small percentage of the heat in the steam that can be utilized in this way, what do you do with the exhaust steam that leaves these engines? This exhaust steam (in the case of non-condensing engines) contains from 90 to 95 per cent of all the heat that the live steam had when it left the boilers, certainly something ought to be done with this exhaust to prevent losing what it cost in the way of coal and labor to make it. There is one way in which a large part of the exhaust steam can be utilised—send it into a **Cochrane Heater** and immediately you will use as much of it as is required for heating the boiler feed supply right up to the temperature of the steam. This also means taking part of the load off the boilers, for with the exhaust steam (a waste product) you will then be heating water that otherwise the boilers would have to heat and for which you would have to supply coal. The boilers also gain other advantages by having a hot feed supply delivered to them. The resulting economy runs all the way to 20 per cent of the entire fuel bill according to the conditions.

Having made provision for heating the boiler feed supply, the remaining exhaust steam can be utilised in the Cochrane Heater for heating any water that may be required for other purposes, or it can be used in an exhaust steam heating system, and the returns from the heating system can be brought back to the heater and utilised as part of the feed supply, thus saving even the heat in the returns.

If you will tell us what your conditions and requirements are, we shall be glad to tell you what a Cochrane Heater can do for you, at the same time submitting detailed specifications, prices, recommendations and guarantee.

Send for our **Catalogue 11-H.**

HARRISON SAFETY BOILER WORKS, Clearfield and 17th Sts., Philadelphia, Pa.

Manufacturers of Cochrane Feed Water Heaters, Cochrane Steam and Oil Separators, and the Sorge-Cochrane Systems.

BAR IRON

Brands { "SLIGO" "CROWN" "TYRONE" } *for* **Staybolts, Chains, Mine Cars** *and OTHER purposes*

CHARCOAL IRON
REFINED IRON
SOFT STEEL

SLIGO IRON & STEEL COMPANY

PITTSBURGH, PA.

Successors to PHILLIPS, NIMICK & CO.

ESTABLISHED 1823.

Sloss-Sheffield Steel and Iron Company

BIRMINGHAM, ALABAMA

Manufacturing following well known brands of Foundry Iron:

"Sloss," "Florence," "Sheffield," "Lady Ensley,"

SHIPPERS OF

FOUNDRY COKE FROM WASHED COAL

CELEBRATED

SLOSS PRATT STEAM and BLOCK DOMESTIC COAL

J. W. McQueen, General Sales Agent	Birmingham, Ala.
A. S. Leath, Southern Sales Agent	Birmingham, Ala.
Hugh W. Adams, 15 Beekman Street	New York City
Hugh W. Adams, 85 Water Street	Boston, Mass.
J. R. Dimmick & Co., Drexel Building	Philadelphia, Pa.
J. K. Dimmick & Co., Murtland Building	Pittsburg, Pa.
J. K. Dimmick & Co., Ellicott Square	Buffalo, N. Y.
Robert Field, 1105 Traction Building	Cincinnati, O.
William Wieman, 605 Citizens Bank Building	Cleveland, O.
E. C. Smith, 506 Commonwealth Trust Building	St. Louis, Mo.
David Evans, 1030 Monadnock Block	Chicago, Ill.
W. H. Palmer, Pioneer Press Building	St. Paul, Minn.
Zimmerman-Wells-Brown Co., 2d and Ash Streets	Portland, Ore.
Hardy Greenwood, P. O. Box 751	San Antonio, Tex.
T. R. Hassam, 1 Calle de las Damas 5	Mexico City
F. S. Walshe, 325 Ce. ondelet Street	New Orleans, La.
Edwin R. Haas, 37 Prior Street	Atlanta, Ga.
William Jacks & Co., 41 St. Vincent Place	Glasgow, Scotland

Cable address, SLOSS, BIRMINGHAM, using Lieber's A-1, Watkins, Western Union Telegraphic and the Atlantic Cable Directory Codes.

HERCULES

STEEL FACE PULLEY

Steel Face and Wood Center

Strong and Light Fully Guaranteed

Write for Catalog

FEDERAL MANUFACTURING COMPANY

SMITH STAMPINGS FACTORY—Milwaukee

PRACTICAL POINTS

Chicago, April 4, 1904.

Advertising Editor,
THE IRON TRADE REVIEW,
Cleveland, O.

Dear Sir:

I note your title with interest and wonder at your work for I know the manner of man you will meet. It will be a novelty to him if the editorial pencil cuts out some of his stuff and will help him a whole lot. The advertiser in trade journals is a live man out for business, he has a share of the general prosperity and wants more. He hears of a chance to reach more purchasers and thus he starts the telling of a tale in the advertising columns. Right here is the critical point and a man who can frame the most telling bit of sales eloquence you ever heard will balk like a lathe tool in a sand streaked shaft. He will be glib enough with one possible, face-to-face, customer but when he strikes the many readers his bearings gum up and his lubricant runs dry.

I know an advertiser who has a stock of most interesting information about his work. He enthuses as he talks. You get the history of the firm and learn of the fortunate combination of making and selling skill brought together for the job. The arrangement of the shop, the experimental stages, the perfection of designs, the calculation that limits and the experience that amplifies dimensions, shipping strength, fool proof mechanism, and other things are explained but never a one of them leaks into his advertising unless it filters forth in the weakest way.

One manufacturer has carefully figured out the breaking-down point of tools and gives his machine elements strength to successfully stand anything the cutters will bear, but I never saw the point brought out in any of his advertisements.

There is an eastern man making heavy machinery. He has experimented on the spring of frames--what I may call the construction yield point. He can show you the deflection of frames under strain and with neat instruments exhibit the distortion when pressure comes on the corner of a bed --a rather awkward quantity to estimate correctly any other way. The limit beyond which frames will dodge under heavy

PERTINENTLY PUT

duty is saving knowledge.

Does he or any of these other fellows bring this out in print? Not much. They could put it in the place they pay for but they don't. Nobody can tell these things but those who know them and generally they do not appear to see that selling goods by agent or advertisement needs the same display of facts.

Even a man who can write a convincing business letter wilts at the work of preparing an advertisement, just as though the two were distinctly different. Many a striking advertisement could be built up from the facts scattered in half a dozen live letters. I am told of a recent letter which is good enough for an advertisement in itself. It is from the manager of a plant built anew from the remnants of a destructive fire. He does not wail about his lurid luck. Nor does he invite the charitable to donate him an order for machinery. He isn't that kind. He tells of the business benefit of a fire which burns up patterns and plant and gives the boys a chance to quit or start afresh. It was an ideal opportunity to his view with prospects for making new patterns with all the excellences of the old together with many good features the old designs would not admit. Here is what he says: "You know that no concern in the country could afford to deliberately destroy their old patterns, neither is it possible to make such changes as will always keep them up to date, and it requires some real calamity to compel them to make an entirely new and complete line. It might seem possible for a newly organized company to do this, but they could not have had that associated experience so necessary in discussing and deciding upon seemingly minor but really important details of construction."

You will not get an advertisement like that in many moons. Nothing but much persistent dig and tireless tact will draw forth more than a hackneyed cut and a threadbare story. But you can do it to their benefit and your own.

Encouragingly yours,

John Drummond

AMERICAN STEEL HOOP COMPANY

GENERAL SALES OFFICES:
CARNEGIE BUILDING, PITTSBURGH, PA.

DISTRICT SALES OFFICES:

ATLANTA: - - - - - Equitable Building
BOSTON: - - - - - Telephone Building
BUFFALO: - - - German Insurance Building
CHICAGO: - - - - - - The Rookery
CINCINNATI: - - - Union Trust Building
CLEVELAND: - - - Perry-Payne Building
DENVER: - - - 101, 102 Boston Building
DETROIT: - - - - Union Trust Building
NEW YORK: - - - - Empire Building
PHILADELPHIA: - - - Harrison Building
SAN FRANCISCO: - - - 226 Market Street
ST. LOUIS: - - New Bank of Commerce Building
WASHINGTON: - - National Safe Deposit Building
ST. PAUL: - - - - Pioneer Press Building
NEW ORLEANS: - - - Hennen Building

FOREIGN SALES OFFICES:

CITY OF MEXICO: - - - 924 Apartado
MONTREAL, CANADA: - Bell Telephone Building
SIDNEY, N. S. W.: Mutual Life Bldg,, 14 Martin Place

American Sheet & Tin Plate Company

Frick Building PITTSBURG, PA.

Manufacturers of all varieties of

Iron and Steel Sheets and Tin and Terne Plates

offer valuable information to persons engaged in the METAL and BUILDING TRADES.

An Artistic Booklet, issued by the American Tin Plate Company, contains a brief history of iron and its application to roofing and traces the manufacture of roofing tin from the early days to present time, also a full description of "How to Construct a Tin Roof," and further a great deal of very valuable tabulated information useful to every person interested in the build ng trade.

A Handsome Booklet, issued by the American Sheet Steel Company, contains fine illustrations of the several sheet mills, also tables showing weights of sheets and bundles of standard sizes of **Galvanized Sheets, Woods' Refined Sheets, Woods' Patent Planished Iron and Corrugated Sheets, net prices per pound and per square foot at given rate of discount, etc., etc.**

Either or both Booklets will be sent free and postpaid to any interested person who will cut out and fill in the coupon below and mail as indicated:

W. C. CRONEMEYER, Advertising Agent, 310 Carnegie Building, Pittsburg, Pa. **Cut from The Iron Trade Review**

DEAR SIR:—Please send

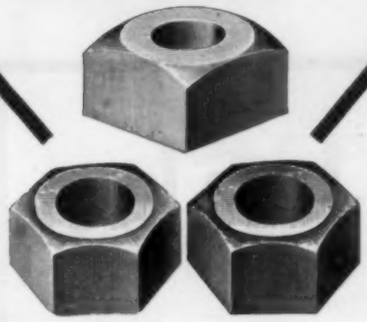
.....Copy of Booklet on Roofing.

.....Copy of Booklet with sizes and weights of standard sizes of sheets.

Name.....

Occupation..... Address.....

"MILTON"



NUTS

HOT PRESSED or COLD PUNCHED

Are made of double refined bar iron. They're true to size, and well finished. This ought to interest you, but if not—the price certainly will.

CATALOG ?

THE MILTON MANUFACTURING CO., Milton, Pa.

AMERICAN IRON and STEEL MFG. CO.

GENERAL OFFICES

Lebanon, Pa., U. S. A.

MANUFACTURERS OF

MERCHANT BAR IRON and STEEL

Annual Capacity About 150,000 Tons

ALSO EVERY VARIETY OF

Machine Bolts, Nuts, Washers, Turnbuckles, Lag Screws, Railway and Dock Spikes, Harvey Grip and other Railway Track Bolts, Boiler, Ship and Structural Rivets, Car Forgings, Rods and Irons for Bridges, Buildings, Etc., Etc.

This Company owns and operates the works formerly owned by

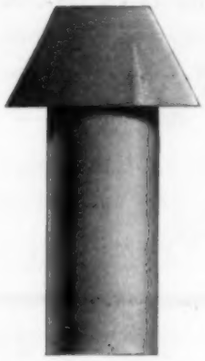
J. H. STERNBERGH & SON, Reading, Pa.

NATIONAL BOLT, NUT AND RIVET WORKS, Reading, Pa.

LEBANON IRON CO., Lebanon, Pa.

EAST LEBANON IRON CO., Lebanon, Pa.

PENNSYLVANIA BOLT AND NUT CO., Lebanon, Pa.



The Upson Nut Co.,

Cleveland, Ohio. Unionville, Conn.

RIVETS

Boiler Structural Tank and Sheet Iron

All accurate to size and from the very best quality of stock. Any shape of the "Head that won't come off."

Catalogue and prices on application.

WIRE MILLS

Producing wire for nails, market, fine wire
Tinning wire and Galvanized wire outfits

Clay Working Tools

CHAIN FACTORIES

Improved ring and link Winders, Cutters, Hammers

New plants installed. Old plants made new.

While you are getting, get the best.

Nearly 50 years' experience behind our goods.

Write for prices, stating capacity wanted

THE TURNER, VAUGHN & TAYLOR CO.

1856 CUYAHOGA FALLS, O., U. S. A. 1904

National Tube Company

Manufacturers of

BLACK and GALVANIZED Wrought Merchant Pipe, all kinds, sizes ⅛-inch to 30-inch, fitted in any manner desired.

BOILER TUBES, Mild Steel and Charcoal Iron, for Stationary, Locomotive and Marine Work.

CASING, TUBING and Drive Pipe for Well Purposes.

GAS and OIL LINE PIPE

CYLINDERS, Lap-Welded and Seamless, tested from 100 to 3,700 lbs., for Compressed Air, Carbonic Acid Gas, Anhydrous Ammonia, etc., etc., etc.

WATER and GAS MAINS, Converse and Matheson Lead Joint Pipe, 2-inch to 30-inch.

SEAMLESS TUBES, Shrapnel, Projectiles and Miscellaneous Forgings.

GENERAL OFFICES

FRICK BUILDING, PITTSBURG, PA.

LOCAL SALES OFFICES

Havemeyer Building, New York
Pennsylvania Building, Philadelphia
Frick Building, Pittsburg
Western Union Building, Chicago
420 California Street, San Francisco, Cal.

REPUBLIC
IRON & STEEL COMPANY

GENERAL OFFICES CHICAGO ILLINOIS U.S.A.

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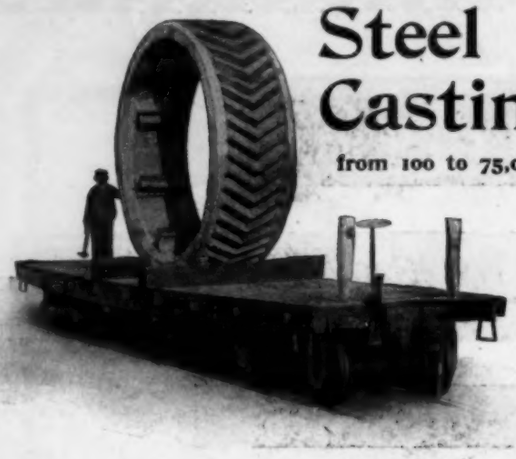

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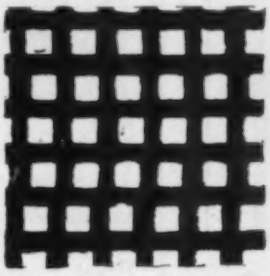

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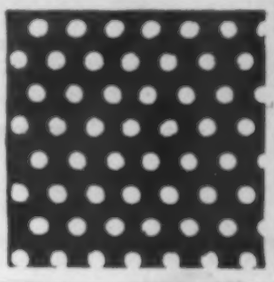

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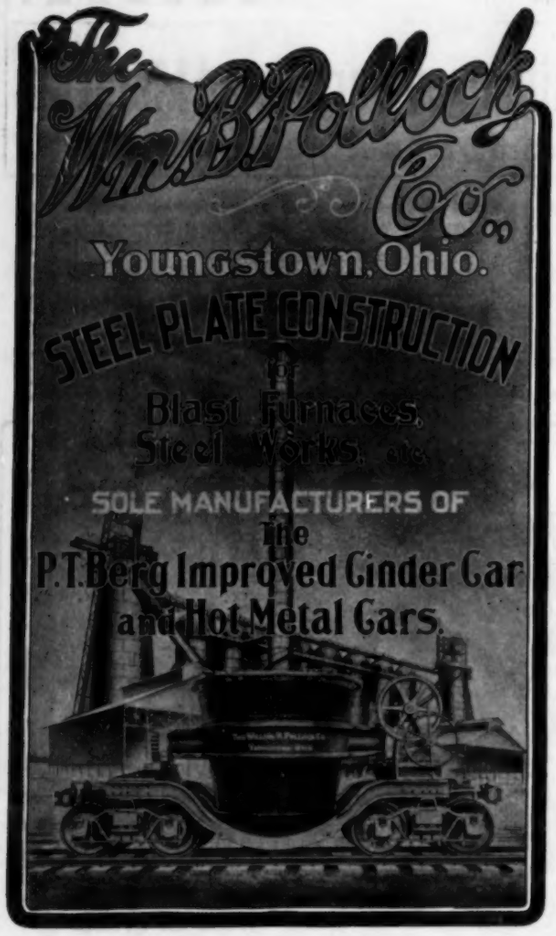

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